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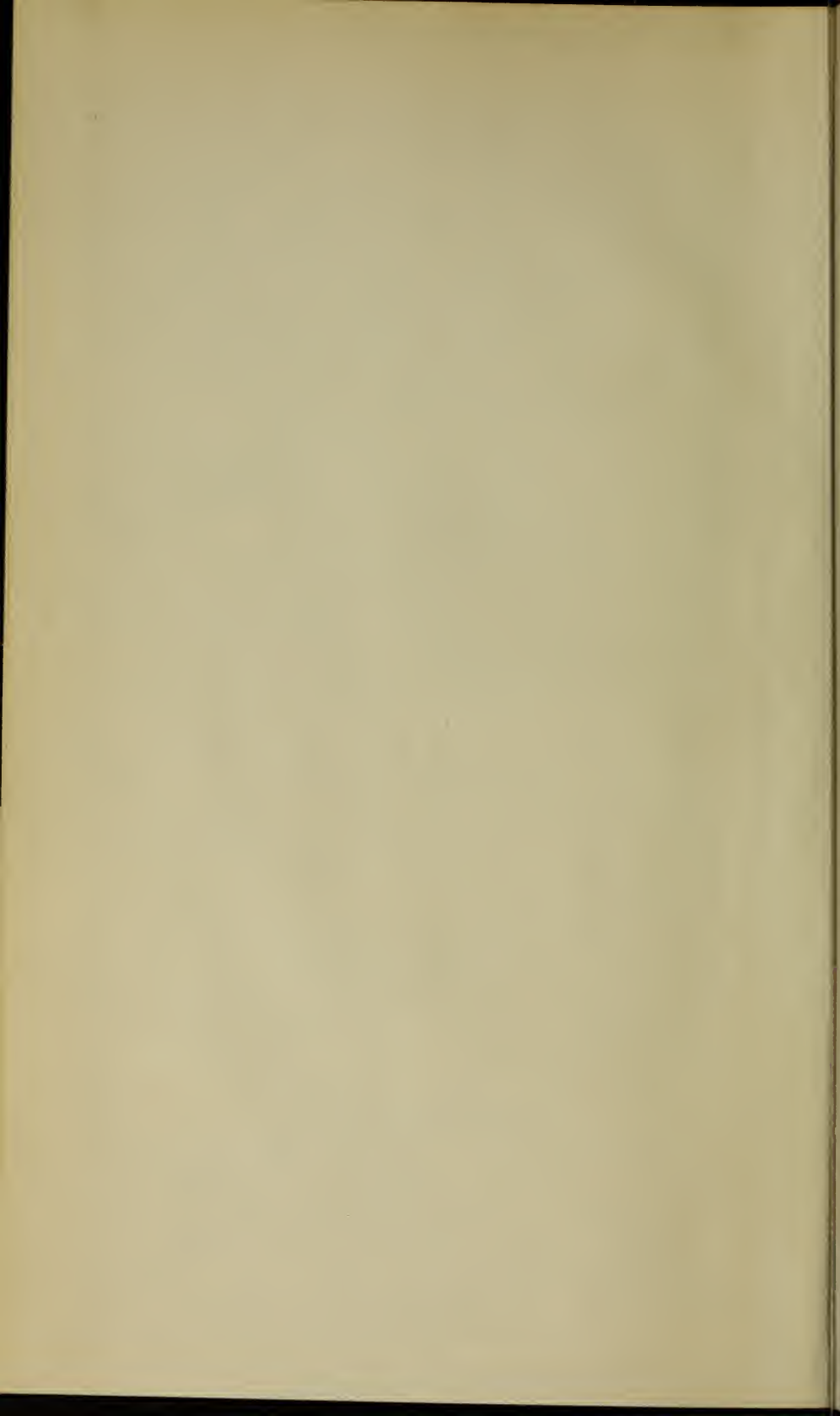
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1942-1945





BULLETIN

of the

Lowell Textile Institute

LOWELL, MASS.

Issued Quarterly

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6150

Moody Street and Colonial Avenue

THE UTILIZATION OF EQUIPMENT

Commencement Address, Lowell Textile Institute, Lowell, Massachusetts
June 10, 1941

ARTHUR BESSE, A.B., *President National Association of Wool Manufacturers*

It is not for me to welcome the graduating class of the Lowell Textile Institute into one of the several branches of the textile industry. Nor shall I attempt to give you the one missing thought you may have vainly pursued these many months — the one true key to the complicated problem of how to make good in the textile industry. You have had the opportunity of studying at one of the leading textile schools of the country. If there are holes in your armor or gaps in the fullness of your technical knowledge, I am not going to attempt to correct in 20 minutes deficiencies which perhaps have been in the making for several years. If you couldn't remember those things which Professor Barker and others on the faculty have tried to pass on to you, I am sure you would likewise forget if the same things were now repeated to you on a more profound occasion by a less profound person.

I prefer to speak rather on the utilization of equipment. Ere you conjure up visions of data on machine efficiency or before you review the arguments for and against the third shift, I can put you at ease by saying that I refer not to textile equipment at all, but to mental equipment. Mental equipment is not standard — it cannot be *bought* as one would buy a W-3 loom — but like a W-3 loom it represents capital equipment, and unless it is put into use and operated, one obtains no return on this part of his invested capital.

Everyone who buys an expensive piece of machinery contrives if he can to keep it running on a full schedule so that it will not, like the idle horse, eat its head off in the stable. But many of us with substantial investments in our own education seem content to leave our minds — after all the end product of our educational efforts — virtually inactive. Once the coveted diploma is secured, we wrap the mind up carefully in various types of protective covering, secure in the consciousness that its delicate mechanism will henceforth be adequately protected against the shocks of an unfriendly world. The mind is the only capital asset which can be used for years without depreciation. Yet, while we run machines at peak rates and wear them out making goods to sell below cost, we let the mind stand idle, despite the fact that we could operate it without cost, and the value of the resultant product would represent a clear profit.

A great portion of the world's ills today may be attributed to man's inability or unwillingness to think. I say unwillingness advisedly because it seems that the stubborn refusal of some men to think is such that it cannot be explained alone by lack of ability to think but must be due to nothing less than firm resolve to keep the mind from functioning at all.

The lack of thinking — the failure of people to look behind the fair words of the orator to discover the essence of the plans beneath — that lack more than anything else, has enabled power drunk tyrants and pseudo-dictators to lull into inaction the only groups that might successfully have prevented their rise to power. In Germany the groups that assisted the grab of power were hoodwinked into supporting a mad man who was clever enough to play upon personal weaknesses and astute enough to realize that few would weigh the problems with sufficient objectiveness to discern his real designs. These men have now been purged along with those who actively opposed the new order. The strategy has been to crush the weak but to outwit the strong — to use the strong and secure their help by playing on their desire to believe what they wanted to believe, while relying upon their reluctance to really think.

It is the essence of a democracy that individuals do their own thinking. When the members of a democracy permit someone to do their thinking for them — whether the intentions of those to whom the responsibility for thinking has been delegated are men of integrity or not — at that moment democracy becomes imperiled. In a democracy we should not listen to the loudest voice nor to the most persistent, but to the voice which represents the most objective and clearest concept of democratic thought. When the voice to which we listen is the voice of authority rather than the voice of reason, we are at least part way on the road to dictatorship.

The ability of the members of a country to think is the only force assur-

ing the integrity of the governing body. The necessity for proving the wisdom of a proposed course of action to an intelligently skeptical electorate is the only safeguard which can permanently insure the integrity of a government based in any degree upon the support of the people. When this check is gone, when the government no longer has to prove its case to citizens who can think for themselves, the way is opened for a grab of power, a concentration of authority, and for devices which put the citizen in a position where he no longer can protest, where his vote is no longer a brake on the greed and avarice of his rulers.

Paraphrasing the title of William James' "The Will to Believe," Bertram Russell has written a most valuable little book called "The Will to Doubt." This book should be a "must" in any educational program. Mr. Russell does not advocate a nation of skeptics but he does point out the importance of not accepting statements without first making an analysis of what they mean — or as is often the case, of what they attempt to conceal. Thoughts and ideas are not to be swallowed like doctors' pills with a blind reliance on the infallibility and the super-intelligence of the one who concocted them. We *have* to take pills on faith — or go without and hope Nature can cure us without aid from the medical profession. But we do not have to accept ideas and opinions in the same way. Particularly should we be suspicious of ideas too plausibly and too smoothly expressed. The more bitter the pill the heavier the sugar coating; the more sinister the propaganda the more carefully is its real nature hidden. How many of the German industrialists who originally supported National Socialism wish they had listened less and thought more. Had they been keener to analyze the proposals and less intrigued with a glibly promised solution of certain immediate problems, they might have averted their present condition of industrial servitude.

Do not think that I speak only of the totalitarian countries of Europe and of Asia. The disinclination or the inability to think is today just as evident in America as it is in Europe, and the results here may be quite as tragic. We have lost the safeguards which insured integrity in our government, and we have shown a digestive aptitude for false economic and political dogma which invites and assures more of the same diet. Perhaps already we have gone too far along the road to dictatorship to have any longer the alternative of thinking, of analyzing, and of choosing our course of action. Perhaps we have not soon enough sensed the essence of what was happening to our democratic institutions. Consider for example our Supreme Court — once the citadel of impartial objective thought. It is getting closer and closer to the point where it may become a mere adjunct of a political machine, a group of advocates rather than a court of judges. What kind of a safeguard for Liberty will the Supreme Court be if it is allowed to become a part of the maelstrom of political life — "subject to the shams, hypocrisies and compromising expedencies of political maneuvering?"

We cannot claim that a watchful electorate has compelled our own government to maintain its integrity. It is only too evident how this administration evaluates the ability of its citizens to think when time and time again it justifies its requests for legislative action by reasons which thinking men cannot possibly accept as honest expressions of its real purposes. May I cite chapter and verse?

There is the demand for a continuation of the power to devalue the dollar — a power which, we were told in 1933, was needed because prices were falling, but which we are now told is needed despite the obvious fact that prices are increasing.

There is the insistence upon certain pet projects — the St. Lawrence Waterway, the Passamaquoddy Dam, the Florida Ship Canal — all demanded in the name of National Defense. The contribution these projects could make to National Defense would be distinctly a negative one — drawing needed labor and needed materials from important defense undertakings.

There are repeated exhortations to all of us to do our part for national defense, despite the fact that at the same time certain agencies of the government are aiding the farmers and the labor groups to turn the defense effort to their personal advantage. The signs now read: "*This means you* — unless you are a farmer or a labor union man."

There is the assurance given us that American boys will not be sent abroad to fight. These assurances would be more convincing to those who actually think about them were it not for the taking over of numbers of ships for conversion into army transports. We are told that our present military efforts are solely for *defense*. It seems to many of us that this country already is conducting an *offensive* campaign against Germany, Italy and Japan—a campaign which undoubtedly would be branded as an offensive save for the fact that it has not yet suited the convenience of the Axis so to characterize it.

We hear abuse and blame heaped upon steel and aluminum men because supplies are inadequate when we know that the real difficulty is due to the failure to develop any key plan—even a tentative one—a year ago.

We read of a new bill permitting the requisitioning of *anything, anywhere*, which some attempt to justify by more or less indirect and—in view of the record—far from convincing references to strikes in defense industries. Is such authority needed, or would it be desired, in a really democratic set up?

However noble the motive, can we be proud of the cruel deception of Greece and Yugoslavia by offers of aid, which a thinking person should have known we were in no position to deliver?

We did not begin to arm ourselves until one short year ago. We have, as is only too well known, no arsenal upon which our own troops in training can draw, let alone the troops of a foreign country actually engaged in hostilities. We have had to dismount guns designed for the defense of New York Harbor to send to Bermuda and Newfoundland. We cannot find enough rifles and ammunition, or tanks, or anti-aircraft guns, or planes, with which to accustom our present force of 1,400,000 men to the instruments of modern war. And yet we offer to all democracies the vast store of arms in our non-existent arsenal.

These illustrations could be added to almost indefinitely.

We have been and we are being misled but we cannot escape the fact that we have invited and merited the deception which has been practised upon us. Groups here, as in foreign countries, have discovered that they can get away with it. They have discovered that the public can be easily deluded and deceived. Accordingly they take the easiest course. Patience and plausibility are about all that is required. These suffice to sugar-coat the capsule and we swallow it in sublime ignorance of the poison that is contained within. Too long have we left unused the one real safeguard we have—the power to think, to analyze and to evaluate—"the will to doubt"—the determination to insist upon being shown what the real objectives are.

Perhaps we have gone too far already. Perhaps the liberty of man must be won the hard way. I do not profess to know, but I confess to a feeling of bewilderment when I see this nation being herded into a war which few of us believe we should enter, in order to restore to Europe the very democratic principles which we ourselves are in the process of losing.

If we are saved, we must be saved by men who can *think*, and who, because they can think, have what we call—with little conception of what it really is—"vision." And if we are saved by vision, it will be the vision of youth. Youth of the privileged class, youth that has had the advantage of training in a trade where knowledge is essential but where knowledge is unproductive without thinking, youth that comes to maturity without preconceived concepts of the whys and wherefores, youth that wants to know the essence and is not satisfied with the mere form. If we are saved, it will be by you and by others of your generation, and it will be not because of the knowledge you have acquired but because of the ability to think which you have developed.

To you, and to others of your age, we must look for sanity and for ultimate salvation. Your knowledge of the textile arts and your equipment for a successful career in industry, will avail you little if you do not do your part in collective thinking which will result in a world in which you are free to follow your chosen profession.

Don't let your mind stand idle; put it to work. Don't leave your most valuable equipment unused. Don't allow yourselves to be "taken in."

"There can be no synthetic integrity; there is no substitute for thought."

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A DETERMINATION OF THE LOAD TO STRAIGHTEN BUT NOT STRETCH SINGLE COTTON YARNS OF DIFFERENT NUMBERS

By HERBERT J. BALL, S.B., B.C.S., *Professor of Textile Engineering*

In the testing of yarns and threads it is customary to specify in some manner the tension to be applied in the case of certain important length-measuring operations in which the final results will be affected by the magnitude of the applied tension. Some examples are the winding of a standard skein for yarn number determination, the use of a definite length of yarn in a twist tester for determination of the twist per inch, the direct measurement of the total length of yarn or thread on a package, and the insertion of a definite length of test specimen between the jaws of a strength tester when ascertaining the load-elongation characteristics of the material.

Presumably the length desired for such purposes is that of a straight but unstretched yarn, of a yarn free from the waviness, bends and kinks characteristic of yarn unwound from a package. The waviness is caused by the winding of the yarn in spiral or helical form around the center or core of the bobbin or package. The height and length of the wave formation will depend on the radius of curvature of the surface where winding-on took place. In this respect then a warp-wound yarn may be expected to differ from a filling-wound yarn. Bends originate from the changes in direction which occurred at the crossing points of the yarn on the package. Kinks or partial kinking are due to the twist in the yarn. The tendency to kink is always present in a single yarn although it may not always become apparent until the twist has reached a critical point. The permanency with which all these deviations from the straight line carry over into the unwound yarn will depend upon such factors as the tightness of wind of the package, the length of time the yarn has been in the wound condition, and the atmospheric conditions to which it has been exposed during storage.

A review of the magnitudes of the tensions specified in test procedures suggests an empirical origin, and actual data upon which to rest a more rational specification seems to be non-existent. Therefore at the suggestion of Mr. A. C. Clifford, 1922, chairman of Subcommittee A-1, Section II on Cotton Yarns and Threads of Committee D-13 of the American Society for Testing Materials, it was decided to secure some data through thesis projects. The results given in this paper are based upon data selected from two theses, performed under the direction of the writer, by Bronislaw J. Swiatek, 1940, and Jose V. Gari, 1941, as a partial requirement for the degree of Master of Science in Textile Engineering and Bachelor of Textile Engineering, respectively.

More specifically the purpose of the two investigations was directed to measurements of the load necessary to straighten, but not stretch, a single cotton yarn in the form it assumes when unwound from a bobbin, or in other words the load to remove the crimp. This latter term is defined for the purpose of this paper as the difference between the straightened and unstraightened length measured along the axis of the yarn.

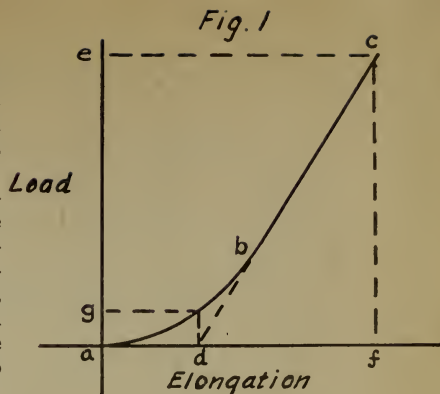
It is assumed that the application of any straightening force, however small, will also stretch the yarn. Hence some method must be employed which will break up the total resulting elongation into its two components, namely, that due to the removal of crimp and that due to the stretch of the yarn. The method used is an adaptation of one developed by E. D. Walen, 1914, for measuring the crimp in a yarn taken from a woven fabric. The principle in brief is as follows. Small, equal increments of load are applied chainomatically to the yarn and the corresponding elongations are carefully measured by means of a linear comparator. These data are plotted giving a load-elongation diagram *abc*, Fig. 1.

The straight portion, *cb*, is extended to cut the elongation axis at *d*, thus dividing the total elongation *af* into two parts. The portion *df* represents the stretch of the yarn and *ad* the crimp. *ag* is taken as the load to remove crimp or to straighten the yarn.

The yarns used in these theses were single cotton yarns obtained from a variety of industrial sources. They were not prepared especially for this pur-

pose but were taken at random from whatever supply was available. They were thoroughly conditioned before testing in an atmosphere whose relative humidity was $65 \pm 2\%$.

Each yarn was first tested for yarn number and twist per inch, from which the corresponding twist multiplier was computed. It was then tested for load to remove crimp in the manner described above, using an initial length of specimen of ten inches approximately. The results are given in Table I and separated into two groups according as the yarn came from a warp-wound or a filling-wound bobbin. Individual values falling more than three times the standard deviation from the mean were rejected. The grams per denier has been calculated from corresponding values of actual yarn number and the load to straighten the yarn.



DISCUSSION

Considering yarns from warp-wound bobbins first, it is obvious that as the yarn number increases from 3 to 103, the load required to straighten a yarn decreases from $3\frac{3}{4}$ to $1\frac{1}{4}$ grams approximately. For filling-wound yarns the same character of trend is apparent but is somewhat more pronounced. For an increase in yarn number from 3 to 78 the load decreases from $4\frac{3}{4}$ to $1\frac{1}{4}$ grams approximately. The nature of this relationship and the fact that it is not linear is brought out more clearly by reference to the full lines in Fig. 2.

Reasons may be adduced as to why the relationship might be expected to be curvilinear. The straightening out of a spiral or helical wave formation in the yarn may be likened to the application of an axial force to either a helical or a spiral spring. In either case the force required will be a function of a higher power of the diameter. The straightening out of a bend in the yarn may be regarded as similar to the straightening of a deflected round beam or a bent column by means of an axial tension. Here again in either case the straightening force is a function of a power of the diameter higher than the first.

In seeking for a possible reason as to why the curves cross (at a yarn number of 27), it is interesting to note that for the yarns coarser than 27's the average twist multiplier of the filling yarns is 4.51 against an average of 4.14 for the warp yarns. On the other hand for yarns finer than 27's, the average twist multiplier of the warp yarns is 4.40 against a corresponding value of 4.07 for the filling. Thus in these two comparisons the line at the higher level seems to be associated with a higher twist multiplier. However, the fact that the branch of the line whose average twist multiplier is 4.40 is below that whose average is 4.14 suggests the modifying influence of some other factors.

The quantity, grams per denier, given in the last column of Table I was computed in order to determine whether the loads to straighten yarns produced the same unit-stresses in each. The results indicate a very marked increase in unit-stress as yarns become finer and the relationship is curvilinear.

One method of stipulating the tension to be applied to a yarn is to specify that it shall be equal to the weight of a fixed number of yards, for example, 100. This has the effect of keeping the unit-stress identical in yarns of any size. Inasmuch as it was shown in the last paragraph that the unit-stress does not remain constant, the yardage corresponding to each straightening force has been computed and the results are shown graphically by the dotted lines of Fig. 2. For this computation the value of the straightening force was taken from the curves shown in full lines and not from the actual test data.

It is suggested that use may be made of the results reported herein in three ways. 1. The specific straightening force in grams for any cotton yarn can be read directly from the plots (full lines) and used as such. This means a different tension for each yarn. 2. A table may be prepared from the plots specifying convenient stepped loads, each covering a range of yarn numbers, for example, the use of $4\frac{1}{4}$ grams for filling yarns from 3's to 13's. 3. The straightening forces in 1 and 2 may be expressed, if desired, in terms of yardage of yarn by direct reading from the plots (dotted lines).

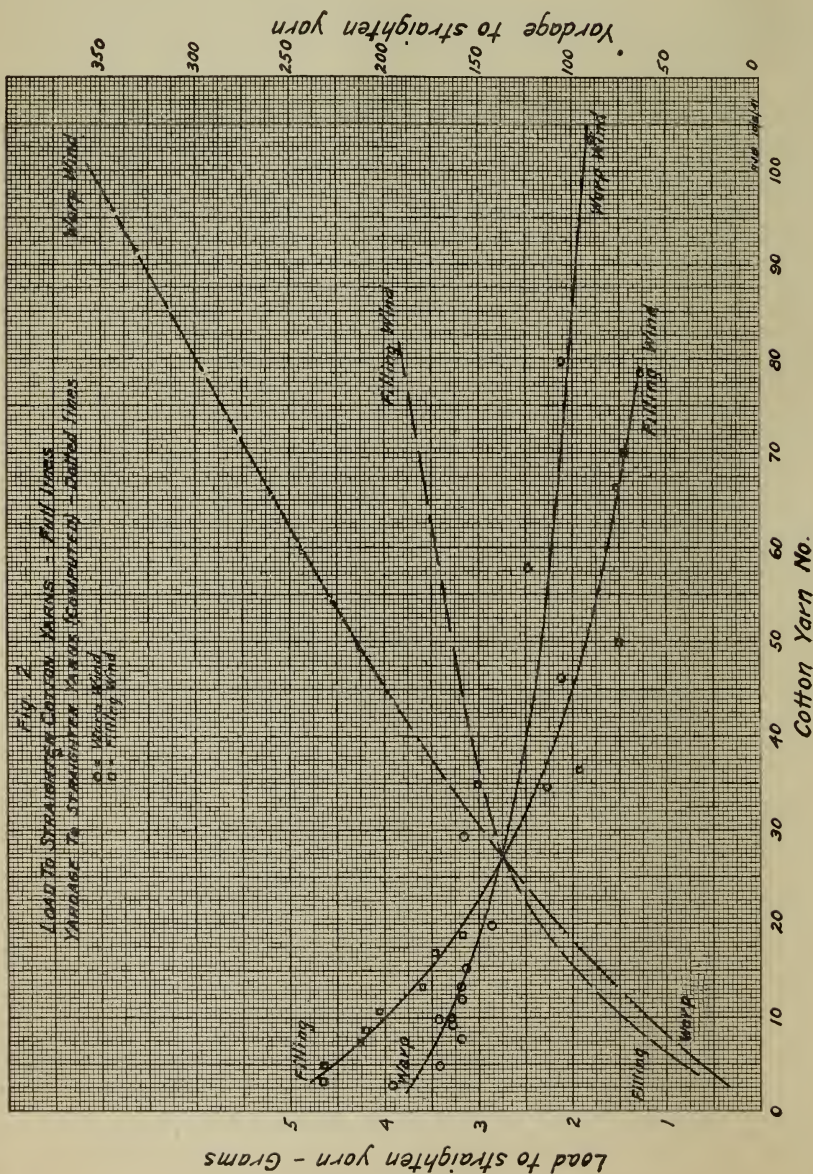
TABLE I

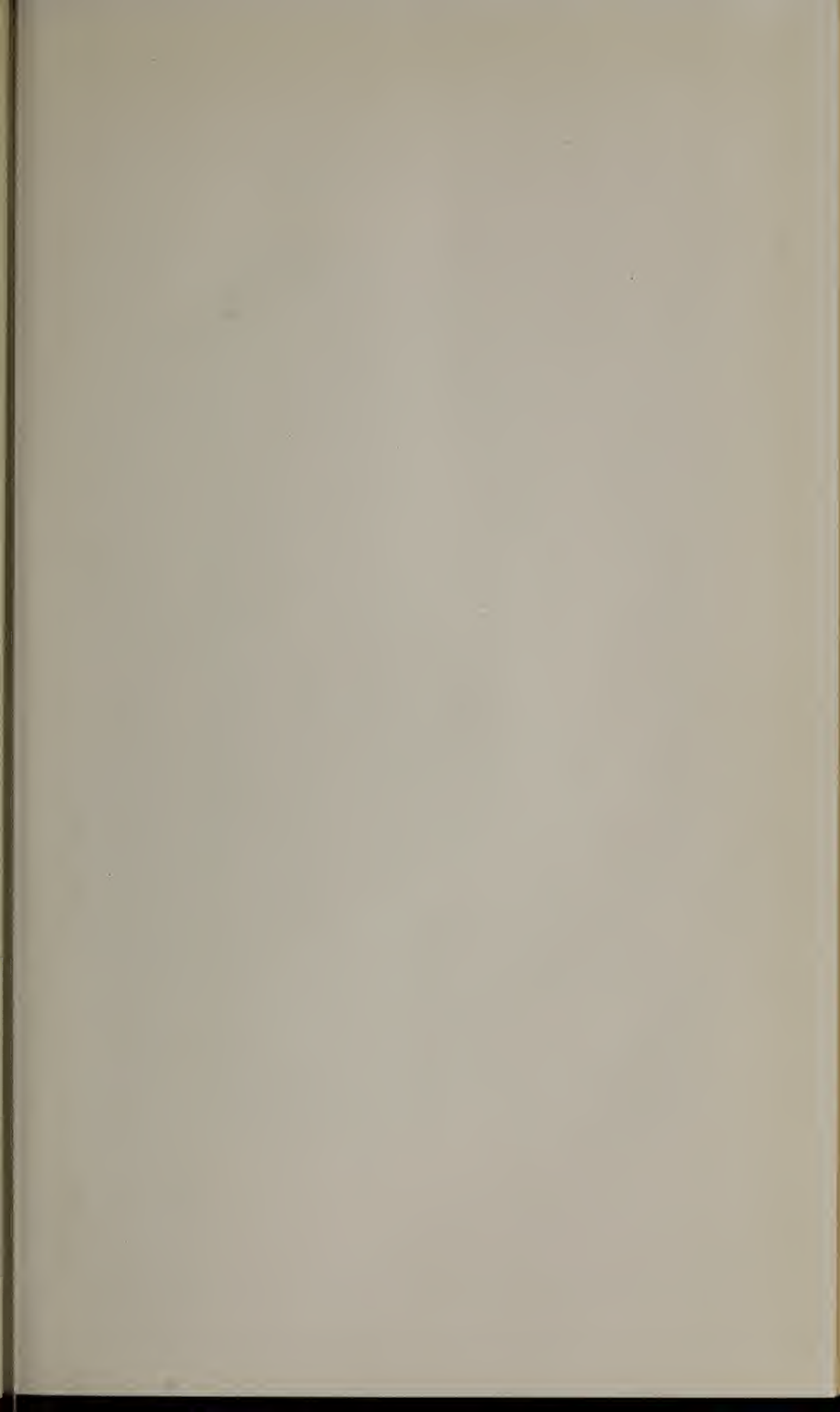
SINGLE COTTON YARNS FROM WARP
WOUND BOBBINS

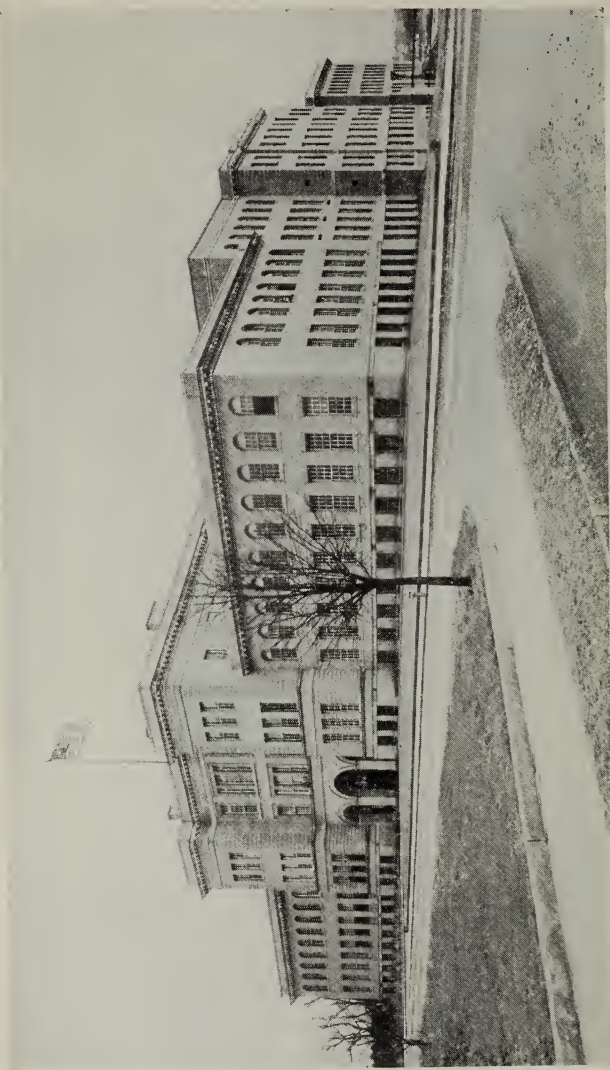
Actual Yarn Number	Twist Multiplier	No. of Tests	Load to Straighten Yarn (Grams)	Denier (Grams per x 100)
2.9	3.8	50	3.91	0.21
4.9	3.9	10	3.41	0.31
7.6	4.1	10	3.18	0.46
9.2	4.0	10	3.27	0.57
9.8	4.1	10	3.42	0.63
9.9	4.9	50	3.28	0.61
11.8	3.6	50	3.17	0.70
13.3	3.9	50	3.19	0.80
15.1	4.2	10	3.12	0.89
19.8	4.8	50	2.86	1.07
29.3	4.8	50	3.15	1.74
34.6	5.9	50	2.27	1.48
46.2	4.3	50	2.11	1.84
57.8	3.4	50	2.47	2.69
79.6	4.0	50	2.11	3.16
103.3	3.9	50	1.79	3.48

SINGLE COTTON YARNS FROM FILLING
WOUND BOBBINS

3.1	4.2	10	4.63	0.27
5.0	4.4	10	4.65	0.44
7.3	4.1	10	4.26	0.59
8.8	4.6	10	4.21	0.70
10.6	5.0	10	4.06	0.82
13.3	4.6	10	3.60	0.90
16.9	4.4	10	3.46	1.10
18.8	4.8	10	3.18	1.13
35.0	3.9	10	3.02	1.99
36.4	3.7	10	1.93	1.32
49.9	4.4	10	1.51	1.42
66.2	4.0	10	1.53	1.91
70.0	4.3	10	1.47	1.94
78.4	4.1	10	1.28	1.89







Southwick Hall

Louis Pasteur Hall

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CALENDAR

1941-1942

September 15-16, Monday-Tuesday . . .	Entrance Examinations
September 15-20, Monday-Saturday . . .	Re-examinations
September 18, Thursday, 9.30 A.M. . . .	Registration for Freshmen
September 22, Monday	Registration for upper-class students
	Classes begin for Freshmen
September 23, Tuesday	Classes begin for upper-class students
October 13, Monday	Holiday — Observance of Columbus Day
November 11, Tuesday	Armistice Day — Holiday
November 26, Wednesday, 4.00 P.M. . . .	Thanksgiving recess begins
December 1, Monday, 8.30 A.M.	Thanksgiving recess ends
December 19, Friday, 4.00 P.M.	Christmas recess begins
January 5, Monday, 8.30 A.M.	Christmas recess ends
January 19, Monday	First term examinations begin
January 30, Friday	End of first term
February 2, Monday	Second term begins
February 23, Monday	Holiday — Observance of Washington's Birthday
April 3, Friday	Good Friday — no classes
April 20, Monday	Holiday — Observance of Patriots' Day
April 21, Tuesday	Final examinations for seniors begin
May 5, Tuesday	Commencement
May 18, Monday	Final examinations begin for first, second and third year students
May 30, Saturday	Memorial Day — Holiday
June 11-12, Thursday-Friday	Entrance Examinations

1942-1943

September 8-9, Tuesday-Wednesday . . .	Entrance Examinations
September 8-12, Tuesday-Saturday . . .	Re-examinations
September 10, Thursday, 9.30 A.M. . . .	Registration for Freshmen
September 14, Monday	Registration for upper-class students
	Classes begin for Freshmen
September 15, Tuesday	Classes begin for upper-class students
October 12, Monday	Columbus Day — Holiday
November 11, Wednesday	Armistice Day — Holiday
November 25, Wednesday, 4.00 P.M. . . .	Thanksgiving recess begins
November 30, Monday, 8.30 A.M.	Thanksgiving recess ends
December 18, Friday, 4.00 P.M.	Christmas recess begins
January 4, Monday, 8.30 A.M.	Christmas recess ends
January 11, Monday	First term examinations begin
January 22, Friday	End of first term
January 25, Monday	Second term begins
February 22, Monday	Washington's Birthday — Holiday
April 19, Monday	Patriots' Day — Holiday
April 20, Tuesday	Final examinations begin for seniors
April 23, Friday	Good Friday — no classes
May 4, Tuesday	Commencement
May 10, Monday	Final examinations begin for first, second and third year students
May 30, Friday	Memorial Day — Holiday
June 10-11, Thursday-Friday	Entrance Examinations

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CHARLES LINCOLN HOWARTH, B.T.C.	North Billerica
Assistant Professor in Chemistry and Dyeing Department	
HARRY CHAMBERLAIN BROWN, S.B.	272 Merrimack Street
Assistant Professor in Textile Engineering Department	
JAMES GUTHRIE DOW, A.B.	11 Robbins Street
Assistant Professor in Language Department	
A. EDWIN WELLS, B.T.E., Ed.M.	37 Ashland Street, Melrose Highlands
Assistant Professor in Textile Engineering Department	
JAMES HARRINGTON KENNEDY, JR., B.T.E., M.S.	177 A Street
Assistant Professor in Wool Department	
CHARLES FREDERICK EDLUND, B.S., Ed.M.	272 Merrimack Street
Assistant Professor in Textile Engineering Department	
JOHN HENRY SKINKLE, S.B.	Chelmsford
Assistant Professor in Chemistry and Dyeing Department	
HORTON BROWN, B.S.	178 Atlantic Avenue, Marblehead
Assistant Professor in Textile Engineering Department	
WINFORD SYKES NOWELL, B.M.E.	5 Fulton Street, Methuen
Assistant Professor in Finishing Department	
FRAZ EVRON BAKER, B.T.E.	12 Seneca Avenue, Chelmsford
Assistant Professor in Cotton Department	
CHARLES HARRISON JACK	71 Canton Street
Instructor in Textile Engineering Department	
RUTH FOOTE, A.B., S.B.	46 Victoria Street
Instructor and Registrar	

ALBERT GREAVES SUGDEN	673 School Street
Instructor in Weaving Department	
ARTHUR JOSEPH WOODBURY	41 Morey Street
Instructor in Cotton Department	
RUSSELL METCALF FOX	359 Beacon Street
Instructor in Textile Design Department	
CHARLES ARTHUR EVERETT, B.T.C.	Chelmsford
Instructor in Chemistry and Dyeing Department	
WILLIAM GEORGE CHACE, Ph.B.	Westford
Instructor in Chemistry and Dyeing Department	
JOHN LESLIE MERRILL, B.T.E.	2026 Middlesex Street
Instructor in Weaving Department	
MILTON HINDLE, B.T.E.	25 Thurston Road, Melrose Highlands
Instructor in Textile Engineering Department	
WALDO WARD YARNALL, B.S.	127 Wentworth Avenue
Instructor in Physical Education	
VITTORIA ROSATTO, B.S.	63 Bradstreet Avenue
Instructor in Textile Design Department	
JOHN LAHIFF DOLAN, A.B.	173 Pleasant Street
Instructor in Textile Engineering Department	
CHARLES JOHN SCULLY, A.B.	31 Bellevue Street
Instructor in Textile Engineering Department	
CHARLES LINCOLN DALEY, B.T.C.	392 Princeton Street
Instructor in Chemistry and Dyeing Department	
CARL ARTHUR CARLSON, B.S.	272 Merrimack Street
Instructor in Textile Engineering Department	
PAUL CHARLES PANAGIOTAKOS, S.B., Ph.D.	7 Kingston Street, Lawrence
Instructor in Chemistry and Dyeing Department	
PAUL DAVID PETTERSON	East Chelmsford
Instructor in Textile Engineering Department	
ELMER PERCY TREVORS	18 Rhodora Street
Assistant Instructor in Chemistry and Dyeing Department	
ROBERT DANA CARMICHAEL	R.F.D. No. 1, Lowell
Student Instructor in Textile Engineering Department	
ERNEST PETER JAMES	47 High Street, Haverhill
Student Instructor in Chemistry and Dyeing Department	
RALPH PEABODY WEBB	450 Broadway, Dracut
Student Instructor in Cotton Department	
MAURICE WILLIAM HARRISON	18 Bellevue Street
Student Instructor in Textile Design Department	
WALTER LISIEN	85 Whipple Street
Student Instructor in Chemistry and Dyeing Department	
WALTER BALLARD HOLT	37 Albert Street
Bursar	
FLORENCE MOORE LANCEY	46 Victoria Street
Librarian	
HELEN GRAY FLACK, S.B.	445 Stevens Street
Secretary	
MONA BLANCHE PALMER	685 Westford Street
Clerk	
FIDELIA D. DAVOL, A.B.	31 Pentucket Avenue
Clerk	

HISTORICAL SKETCH of the LOWELL TEXTILE INSTITUTE

By virtue of legislative acts of 1928, the Lowell Textile School became known as the Lowell Textile Institute in order to define more clearly the standing of the institution. This was the natural result of the development of the original ideas and policies of the trustees who founded the Lowell Textile School. The articles of incorporation were authorized by Chapter 475, Acts of 1895, and provided for a corporation to be known as the Trustees of the Lowell Textile School of Lowell, Massachusetts. The movement for the establishment of the school dates from June 1, 1891, but it was not opened for instruction until February 1, 1897.

In accordance with the acts of incorporation the Board of Trustees consisted of twenty permanent and self-perpetuating members, three-fourths of whom must be "actively engaged in, or connected with, textile or kindred manufactures." In addition, his Honor the Lieutenant-Governor, the Commissioner of Education of the State, the mayor, the president of the municipal council, the superintendent of schools of Lowell, and a representative of the textile council were members *ex-officio*. Legislative acts of 1905 and 1906 authorized the graduates of the school to elect four trustees serving for periods of four years each.

By virtue of the anti-aid amendment to the State Constitution, and by Chapter 274, General Acts of 1918, the property of the school was transferred on July 1, 1918, to the Commonwealth of Massachusetts, and the control and management of the school was vested in a Board of Trustees appointed by the Governor, "with all the powers, rights and privileges and subject to all the duties" of the original Board.

In locating the Institute at Lowell, which has been called the "Mother Textile City of America," considerable advantage is secured by close association with every branch of the industry, which utilizes almost every commercial fiber in the products of the great Merrimack Valley textile district.

Although the school was formally opened by Governor Roger Wolcott on January 30, 1897, in rented quarters in the heart of the city, it was not until January, 1903, that the first buildings of the present plant were ready for occupancy. On February 12, 1903, Governor John L. Bates dedicated the present buildings.

PURPOSE AND SCOPE OF THE INSTITUTE

The object of the establishment of the Institute as set forth in the original act was "for the purpose of instruction in the theory and practical art of textile and kindred branches of industry."

The plan was occasioned by the apparent crisis in the leading industry of New England, due to the rapid development of the manufacture of the coarser cotton fabrics in the southern States. It was believed that this crisis could be met only by a wider and more thorough application of the sciences and arts in the production of finer and more varied fabrics.

Following the general methods and systems found successful at the higher polytechnic institutes, it offers thorough instruction in the principles of the sciences and arts applicable to textile and kindred branches of industry. The courses treat not only of the theory but also the application of these principles in the processes, on the machines and throughout all departments of industry involved in the successful manufacture, application and distribution of textile material in any form.

Though from the first the management has kept in view the clearly defined objective which called for the establishment of the Institute, it has developed its curriculum, its methods of instruction, and equipment as the needs of the industry arose. This objective will be kept constantly in view, and as new demands are presented an effort will be made to extend courses, equipment and floor space. The mechanical equipment of the Institute includes the best makes of textile machinery, and these machines, while built as they would be for regular work, are, as far as possible, adapted to the experimental work which is of particular value in such an institution as this.

Because of the breadth, grade and character of instruction given, and because of the standing and personnel of the instructing staff, the Institute has been placed

by both Federal and State educational boards in the class of the higher technological schools of this country.

The United States Civil Service Commission recognizes graduates from the degree courses of this school as proper applicants for the examination to the various positions requiring a knowledge of applied science and engineering, as well as a knowledge of textile manufacturing, in the different departments of the government.

The courses for those students who can attend the day classes are organized to prepare them to enter some one of the various branches of the textile industry. It is required that all such students shall have an educational background equivalent to that of a complete college preparatory course as given by a recognized high school or academy. These textile courses are either of three or four years duration and are described in detail on the following pages of this catalogue.

The evening classes are held for about twenty weeks of the year, and are for those who are unable to attend the day courses. These are similar to the day courses, but are aimed especially to meet the needs of students working during the day in the mills and shops. For entrance to these classes an applicant should have the equivalent of a grammar school education. A detailed description of these courses and requirements is given in another Bulletin, which will be sent upon request.

BUILDINGS AND GROUNDS

The site is a commanding one, consisting of about 15 acres at a high elevation on the west bank of the Merrimack River. It extends to and overlooks the rapids of Pawtucket Falls, which was the first water power in America to be used on an extensive scale to operate power looms. It was contributed by Frederick Fanning Ayer, Esq., of New York City, and the Proprietors of the Locks and Canals on the Merrimack River.

Southwick Hall, the main building, fronting on Moody Street, was contributed by the Commonwealth of Massachusetts and Frederick Fanning Ayer, Esq., and is a memorial to Royal Southwick, a leading textile manufacturer, a public man of earlier days, and a maternal ancestor of Mr. Ayer. It includes a central mass 90 by 90 feet, having three stories and two wings 80 by 85 feet each with two stories and well-lighted basements. The building is pierced in the center by an arched way from which access is had to the wings and to the central courtyard. The northern wing is occupied by the General Offices, Engineering and Finishing Departments, and Library, while the southern wing is occupied by the Chemistry and Dyeing Departments.

Kitson Hall, dedicated to the memory of Richard Kitson, was contributed by Charlotte P. Kitson and Emma K. Stott, his daughters; the Kitson Machine Company of Lowell, founded by Mr. Kitson, was also a generous contributor. This hall makes a right angle with Southwick Hall, is 70 by 183 feet, has two stories and a basement and houses the Cotton Yarn and Knitting Departments, the Mechanical and Electrical Engineering laboratories and the Machine Shop.

The Falmouth Street Building forms the third side of the quadrangle, and consists of three portions, one 60 by 75 feet, three stories, one 75 by 130 feet, three stories, and the head house 70 by 80 feet, three stories and basement. The building is occupied by the picker section of the Cotton Yarn Department, the Design and Power Weaving Department and by the Woolen and Worsted Yarn Department, and contains on the lower floors an equipment for the manufacture of wool yarn from the fleece to the finished yarn. The upper floors are occupied by a great variety of plain, dobby and Jacquard looms, and in a section of the building are the students' lockers and recreation rooms.

Louis Pasteur Hall. By means of a special appropriation made by the Legislature of 1937 a three story addition was placed on a single story building that was previously known as the Colonial Avenue Building which was erected in 1910. This Hall contains on the first floor the Cotton Finishing laboratory with class rooms and offices of the Wool Department. On the upper floors are found the laboratories, class and lecture rooms, library, and research laboratories of the Chemistry and Textile Coloring Department.

CAMPUS

Through the generosity of Mr. Frederick Fanning Ayer the Institute has been provided with a campus and athletic field of about 3 acres. This has been carefully graded and laid out for football and track athletics.

To enclose this field the Alumni Class Fence has been partly built. It is made of forged iron sections supported between brick columns. Each section is contributed by a class, so that in the course of a few years this fence will entirely enclose the field.

In addition to this field there has been developed during the past few years a larger area that was used for baseball for the first time during 1938. This is located northeast of the Institute buildings and will, it is hoped, be further improved to make a modern campus for baseball and other sports.

GENERAL INFORMATION

Application for Admission.—A blank form of application for admission may be found at the end of this bulletin. This should be properly filled out by all applicants, whether entering upon certificate from a secondary school or presenting themselves for examination.

Freshman Registration.—Each freshman is expected to be in daily attendance beginning Thursday, September 10, at 9.30 A.M., and to follow the prepared program which will be placed in his hands. A program which is planned to acquaint the new student with the institution, its location and surroundings, its courses of instruction, its recreational activities and other phases of its life is arranged for the opening week. Unless arrangements for room and board are made previously, the first two days of the week may be used for this purpose. Physical examinations as well as certain other tests are given during this orientation period. Freshman week enables the student to secure the advantages which come from acquaintance with his surroundings, his instructors, the members of his class, student organizations, activities and customs. The overcrowding of the first week of classes with distractions is thus avoided.

Registration.—All upper classmen are required to register on or before the Monday of the week beginning the school year, and all students during the midyear examination period. For unexcused delay in registration a fee of \$5 will be imposed.

Sessions.—The regular school sessions are in general from 8.30 A.M. to 12.20 P.M., and from 1.25 to 4.00 P.M., except Saturdays, when no classes are held. On Saturday afternoons the buildings are closed.

An hour plan designates the hours at which the various classes meet. This is rigidly adhered to, and the student is marked for his attendance and work as therein scheduled.

Attendance.—Attendance is required of all students on fourteen-fifteenths of all scheduled class exercises, provided they meet the requirements of their instructors for the omitted exercises. For every unexcused absence from any class exercise in excess of those allowed, a deduction will be made from the mark obtained in the course in which the absences occurred.

Advisers.—Advisers are appointed for all students, to be of such aid and assistance as they can both inside and outside of school hours. The head of the department in which a student is registered is adviser to upper-classmen, and instructors in charge of freshmen classes act as advisers to freshmen.

Conduct.—Students are required to return to the proper place all instruments or apparatus used in experimental work, and to leave clean and in working order all machinery and apparatus with which they may experiment. All breakages, accidents or irregularities of any kind must be reported immediately to the head of the department or instructor in charge.

Irregular attendance, lack of punctuality, neglect of either school or home work, disorderly or ungentelemanly conduct or general insubordination are considered good and sufficient reasons for the immediate suspension of a student, and a report to the trustees for such action as they deem necessary to take.

It is the aim of the trustees so to administer the discipline of the Institute as to

maintain a high standard of integrity and a scrupulous regard for trust. The attempt of any student to present, as his own, work which he has not performed, or to pass an examination by improper means, is regarded by the trustees as a most serious offense, and renders the offender liable to immediate suspension or expulsion. The aiding or abetting of a student in any dishonesty is also held to be a grave breach of discipline.

Any student who violates these provisions will be immediately suspended by the president, and the case reported at the following meeting of the trustees for action.

Examinations.—For first-year students examinations are held every five weeks, and these serve to inform the student concerning his standing and the progress made. For students in upper classes examinations will be held during the eighth week of each term. Final examinations are held at the end of each term.

In general, the examinations cover the work of the preceding term, but at the discretion of the instructor may include work of earlier terms.

Examinations for students conditioned in first-term subjects are held during the second term, and examinations for students conditioned in the second-term subjects are held in September following.

Any student who fails to complete a subject satisfactorily or to clear a condition at the time appointed, will be required to repeat the subject, and he cannot be admitted to subjects dependent thereon.

A student whose term's standing is as a whole so low that he cannot continue with profit the work of the next term will be required to leave, but he may return the following year to repeat such subjects as are required.

Daily work and regularity of attendance are considered in making up the reports of standing.

Records and Reports of Standing.—During each term informal reports are sent to parents or guardians and to all students; and at the end of each term formal reports are made.

The daily work of the student forms an important part of his record, and no pupil will be awarded the diploma or degree unless this portion of his record is clear.

Books are prescribed for study, for entry of lecture notes and other exercises, and are periodically examined by the lecturers. The care and accuracy with which these books are kept are considered in determining standing.

Library and Reading Room.—That the students may have surroundings conducive to reading and study a moderate-sized reading room with library tables and chairs has been provided. The library shelves contain textile, art, engineering and scientific publications. These are increased from time to time as new technical books of value to textile students are issued from the press. The leading textile papers are kept on file for ready reference.

The Chemistry and Dyeing Department also has a library supplied with books and periodicals which pertain to chemistry in general and textile chemistry and dyeing in particular.

FEES, DEPOSITS, ETC.

Tuition Fee.—The fee for the day course is \$150 per year for residents of Massachusetts. For non-residents the fee is \$250 per year. The fee for students from foreign countries is \$500 per year.

Three-fifths of the fee is charged for a single term. Each term's tuition is payable during the first week of that term. Students failing to make this payment at the specified time will be excused from classes until satisfactory explanation and arrangements for payment can be made. No report of a student's standing will be mailed unless tuition and fees are fully paid. After payment is made no fee or part thereof can be returned, except by special action of the trustees. The above fee includes free admission for any day students desiring to attend any of the evening classes in which there is accommodation.

Special students pay, in general, the full fee, but if a course be taken involving attendance at the school during a limited time, application may be made to the president for a reduction.

Students entering from Massachusetts are required to file with the Bursar a statement signed by either town or city clerk, stating that the applicant's father is a legal resident of Massachusetts.

Athletic Fee.—An athletic fee of \$15 is due and payable at the time of the first payment of tuition.

Deposits.—Students taking chemistry make a deposit of \$25 the first year, and \$25 each term for the second, third and fourth year chemistry course; students taking machine shop are required to make a deposit of \$10. All other students are required to make a deposit of \$10 each year to cover any general breakage.

All deposits must be made before students can be admitted to laboratory work. The unexpended balance of any deposit will be returned at the end of the year to students not otherwise in arrears.

Student Aid.—The Student Work Program under the National Youth Administration for Massachusetts has been carried on during the years that these funds have been available. The average amount earned by each student assigned to a project is approximately ten dollars per month. Applications should be made to the General Office at the Institute.

Rooms and Board.—Students from a distance, requiring rooms and board in the city, may, if they desire, select same from a list which is kept at the Institute. The cost of rooms and board in a good district is \$12 per week and upwards.

Books and Materials.—Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Each student must provide himself with proper outer garments and wear them in such a manner when working in the various laboratories that clothing and person will be protected and not endangered by moving machinery or chemicals.

All raw stock and yarn furnished to the students, and all the productions of the Institute, remain or become its property, except by special arrangement; but each student is allowed to retain specimens of yarn or fabrics that he has produced, if mounted and tabulated in accordance with the requirements of the department. It is understood that the department may retain such specimens of students' work as they may determine.

No books, instruments or other property of the Institute are loaned to the students to be removed from the premises except by special permission.

Summary of Expenses per Year

Tuition (residents of Massachusetts)	\$150
Tuition (residents of other States)	250
Tuition (foreigners)	500
Chemistry laboratory deposit (1st year)	25
Chemistry laboratory deposit (2d, 3d and 4th years)	50
Athletic fee	15
Machine shop deposit	10
General breakage fee	10
(This applies to students who do not take chemistry or machine shop.)	
Books and supplies	50
(Books and supplies for the first year cost about \$80, second and third year \$35, and fourth year \$50, thus averaging about \$50 per year for the four years.)	

ENTRANCE REQUIREMENTS

Particular stress should be laid upon a thorough grounding in mathematics, including algebra, arithmetic and plane geometry, as these form the basis upon which the work of this school rests. While solid geometry is not required at the present time, the student will find a knowledge of this subject very valuable in his subsequent work, and is strongly recommended to include this subject as one of his electives. A preliminary course in science, including physics and chemistry, serves to prepare the student's mind for the higher branches of these subjects and their application, but neither will be considered as the equivalent of the courses in these branches given in the Institute.

Degree Courses

Candidates for admission to either of the degree courses must be graduates of a school approved by the New England College Entrance Certificate Board or by the board of Regents of New York, and must present a certificate from the principal of the school last attended, reporting upon the subjects pursued and the points obtained according to the schedule of studies given hereafter. A total of fifteen points is required.

A point represents satisfactory work in a year's study in a specified subject in an approved secondary school.

Required Subjects

Algebra A1	1
Algebra A2	1
English	4
Language other than English	2
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 12

Elective Subjects

	Points
Elementary French (two years) or }	2
Elementary German (two years) }	
Advanced French or German (one year in addition to requirements of Elementary French A or Elementary German A).	1
History:	
American	1
Medieval and Modern	1
English	1
Latin	1
Mechanical Drawing	1
Mechanic Arts	1
Solid Geometry	1
Spanish	1
Trigonometry	1

An applicant may also be admitted on the basis of entrance examinations, in which case he must pass a sufficient number of the required subjects to make eleven points and present certificates showing satisfactory courses in such of the elective subjects to make four additional points.

The objective of the elective requirements is to encourage greater breadth of preparation than that covered by the required branches. Certificates covering other subjects than those listed as elective will be entertained.

Diploma Courses

Candidates for admission to the diploma courses are accepted upon presentation of properly vouched certificates showing the completion of a regular four-year course in a high school or academy of reputable standing. The certificate must specify that the applicant has satisfactorily passed the required subjects.

A total of thirteen points is required.

Required Subjects

	Points
Algebra A1	1
Algebra A2	1
English	4
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 10

Elective Subjects

Four may be selected from the list under Degree Courses.

ENTRANCE EXAMINATIONS

All students who are unable to present a certificate for either the degree or the diploma courses must pass entrance examinations. Notification of intention to take these examinations must be made in writing at least a week before the date of the examinations. These will be held as follows:—

Thursday, June 11, 1942; Tuesday, September 8, 1942; Thursday, June 10, 1943:—

Algebra, 9 A.M. to 11 A.M.

History, 11 A.M. to 1 P.M.

English, 2 P.M. to 4 P.M.

Friday, June 12, 1942; Wednesday, September 9, 1942; Friday, June 11, 1943:—

Plane Geometry, 9 A.M. to 11 A.M.

German or French, 11 A.M. to 1 P.M.

Chemistry, 11 A.M. to 1 P.M.

Physics, 2 P.M. to 4 P.M.

Candidates failing to pass the June examinations are allowed to try again in September; those who cannot attend the June examinations may present themselves in September.

REQUIRED SUBJECTS FOR ENTRANCE

Algebra A1.—Derivation and use of simple formulas, graphical representation, the meaning and use of negative numbers, linear equations, with one or two unknown quantities, ratio and proportion, the essentials of algebraic technique, simple cases of exponents and radicals.

Algebra A2.—Numerical and literal quadratic equations in one unknown quantity, the binomial theorem for positive integral exponents, arithmetic and geometric series, simultaneous linear equations in three unknown quantities, simultaneous equations consisting of one quadratic and including graphical solutions, exponents and radicals.

Plane Geometry.—The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures, the circle and the measurement of angles, similar polygons, areas, regular polygons, and the measurement of the circle. The solution of original problems and problems in mensuration of lines and plane surfaces.

Chemistry.—Requirements are those of the New England College Entrance Board, or the Board of Regents of New York, including personal laboratory work. Those not meeting the requirements by school or college certificate will be subject to written examination.

English.—As secondary schools are following to a greater extent than heretofore the requirements of the College Entrance Examination Board, it is recommended that the applicant to this school conform to the suggestions of this Board relative to English composition and literature.

The examination consists of two parts, both of which are given at the same time.

(a) With the object of testing the student's ability to express his thoughts in writing clearly and correctly he will be required to write upon subjects familiar to him. Emphasis will be laid upon the composition, punctuation, grammar, idiom and formation of paragraphs. He will be judged by how well he writes rather than by how much he writes.

(b) The second part of the examination is prepared with the view of ascertaining the extent of the student's knowledge of good literature, and to test this examination questions will be based on the books adopted by the National Conference on Uniform Entrance Requirements. Any course of equivalent amount if made up of standard works will be accepted.

History.—Applicants may offer a preparation of American history, English history, or medieval and modern history.

In American history applicants should be familiar with the early settlements in America, the colonies, their government, the customs of the people, and events which led to the establishment of the United States. They should be informed concerning the causes and effects of the principal wars in which the country has been involved. They should be prepared to consider also questions requiring an elementary knowledge of civil government, as well as historical facts connected with the growth of this country up to the present time.

For the subject of English history or medieval and modern history the course given in any reputable secondary school should give proper preparation. A course extending over a full year with not less than three periods a week will be accepted.

Physics.—The applicant should be familiar with the fundamental principles of physics, particularly those considered under the headings of mechanics, heat, light, electricity and magnetism. Textbook instruction should be supplemented by lecture table experiments. Wherever possible, the student should pursue a laboratory course, but for the present no applicant will be conditioned in this subject if he has not been able to carry on a laboratory course. Where a laboratory course is offered by a secondary school, it should cover at least twenty-five of those experiments listed in the syllabus of the College Entrance Examination Board.

Modern Languages.—Required for degree courses only. It is expected that the work in these subjects has covered a period of at least two years of preparatory school training or the equivalent. Importance should be given to the ability to translate into good idiomatic English, but attention should also be paid to grammar and construction, that greater care may be used in translation.

Elementary German A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple German prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into German.

The requirements include the declension of articles, adjectives, pronouns and nouns; the conjugation and inflection of weak and strong verbs; the simpler uses of the subjunctive; the use of the modal auxiliaries; the prepositions and their uses; the principal parts of important verbs; and the elementary rules of syntax and word order.

Texts used in the language courses of any reputable high or preparatory school will furnish reading for translation. A list of texts is offered by the College Entrance Examination Board.

Elementary French A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple French prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into French.

The requirements include the principal parts, conjugation and inflection of the regular and the more common irregular verbs; the singular and plural forms of nouns and adjectives; the uses of articles and partitive construction; the forms and positions of personal pronouns; and the simpler uses of the conditional and subjunctive.

Suitable texts are suggested by the language courses of any reputable high or preparatory school and by the requirements of the College Entrance Examination Board.

Students who have pursued two years of elementary French as well as two years of elementary German may present one subject to cover two points in the required subjects, and the other to cover two points in the elective subjects.

ELECTIVE SUBJECTS

History.—If the applicant can present all three or any two branches of history specified he may include one as a required subject and the others in the list of elective subjects.

Solid Geometry.—The usual theorems and constructions of good textbooks, including the relations of planes and lines in space, the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangles. The solution of original problems and the applications of the mensuration of surfaces and solids.

Trigonometry.—The usual courses of instruction covered by the standard textbooks on plane and spherical trigonometry will prepare an applicant sufficiently to meet this requirement.

Mechanical Drawing.—The applicant must have pursued such a course in mechanical drawing that he will be familiar with the usual geometrical construction problems, projection of points, lines, planes and simple solids.

Importance is laid not only upon the accuracy with which the work is performed, but upon the general arrangement, appearance and care with which the plates are executed.

It should not be understood that work in this subject may be offered as the equivalent of the first term's work at the Institute.

Mechanics Arts.—The usual courses offered by properly equipped preparatory schools will be accepted as suitable fulfilment of this requirement. Work should include instruction in the handling of both wood and metal working tools in the more simple practices of these arts.

Elementary French B.—Applicants who enter for one of the three-year courses may present one year's work in French in a secondary school. Those who present themselves for examination in this subject should be familiar with the rudiments of grammar, and be able to translate simple French prose into good idiomatic English, also to translate into French English sentences, based on the French given for translation.

Elementary German B.—Applicants who enter for one of the three-year courses may present one year's work in German in a secondary school. What is stated in regard to French applies to those who may present German instead of French.

Advanced French or German.—In cases where applicants have pursued courses in French or German for more than two years, and have completed work which is more advanced than is included under elementary French or German, they may offer the additional year as an elective.

Spanish.—Students offering Spanish should be familiar with elementary grammar, the common irregular verbs, and be able to translate simple Spanish to English or English to Spanish. A preparation equivalent to three periods per week for two years will be acceptable.

Latin.—Students who have pursued one or more years of Latin may present this subject as an elective. Each year's work satisfactorily completed will be considered equal to one point.

ADVANCED STANDING

Candidates who may have received previous training in any of the subjects scheduled in the regular course will, upon presentation of acceptable certificates, be given credit for such work.

COURSES OF INSTRUCTION

Degree Courses.—The four-year degree courses are as follows:

Textile Engineering.

Chemistry and Textile Coloring.

At the completion of these courses the degrees of Bachelor of Textile Engineering (B.T.E.) and Bachelor of Textile Chemistry (B.T.C.) are conferred.

Five options are offered in the Engineering Course, viz., general textile, cotton manufacturing, wool manufacturing, design, or sales option. Each of these courses is planned to train one in the fundamental principles of science found to be applicable in the particular fields of textile chemistry and textile engineering. It is maintained that for one to be successful in either of these important branches of industry a training is required as thorough and broad as that of any of the recognized branches of engineering or of applied science.

With this in mind these courses have been built of a secure framework of science and mathematics, and to it has been added the useful application of these branches in the broad textile field. With the direct purpose of laying a secure foundation in the training, a more extended preparatory course is first demanded, and subsequently in the school work more subjects of a general character are included, that narrowness of judgment and observation may not result by overstimulation of the technical development.

Diploma Courses.—The following courses extend over a period of three years and upon the completion of any one of these the diploma of the Institute is awarded:

Cotton Manufacture.

Wool Manufacture.

Textile Design.

These are the original courses offered at the Institute, arranged to require three years' study and to give the student as thorough a training as possible for his chosen field, stressing particularly the study of textiles.

COURSES FOR WOMEN

Within the last few years the possibilities for women in certain branches of the textile field have become recognized and it is believed that in the future the positions open to them will become more and more numerous. Although all classes are open to women, the subject of textile design is especially interesting to some who choose the Textile Engineering Course with the design option, for it offers a broad training that prepares for many lines of activity. For those who wish to specialize in art and textile designing in their general application, courses will be arranged as far as the facilities of the Institute will permit. Some are interested in textile chemistry and pursue the Chemistry and Textile Coloring Course. These courses lead to positions either in mill offices or in some commercial lines which are desirable and offer congenial work.

GRADUATE COURSES

By act of the General Court of 1935, authority was given to the Lowell Textile Institute to confer degrees of Master of Science in Textile Chemistry and Master of Science in Textile Engineering to graduate students who satisfactorily complete courses of advanced standing.

The object of the courses is to offer to properly qualified graduates of the Institute who hold bachelor degrees an opportunity to pursue advanced courses in their respective department and to take work in other departments. It is also the object to offer to properly qualified graduates holding bachelor degrees of other institutions of higher learning an opportunity to carry on courses in textile education that will prepare them for entrance to that industry.

Graduates of this Institute will be required to devote at least one year residential study and graduates in general of other institutions at least two years residential study in order to receive the Master degree. Admission to advanced standing may be permitted where the applicant can present work which is approved by the department head as equivalent.

The tuition fees and deposits for graduate students are the same as those required for undergraduates. In general a graduate of this Institute shall devote approximately one third of his course to subjects of advanced character in his own department. One third of his course may be in subjects of his own or other departments not taken in undergraduate work and the remaining third of his course shall be occupied in a thesis of an advanced character and approved by the head of the department.

The courses of study for graduates of other colleges and technological institutions cannot be prescribed in detail for the reason that the selection must depend upon previous scholastic work and standing. They must include the essential subjects of textile education required in the particular department which the applicant elects and must receive the approval of the department head as well as the President and Faculty.

Students with proper preparation may be admitted to advanced courses but cannot be candidates for degrees unless they fulfill the above described requirements. All courses both undergraduate and graduate are open to women.

PHYSICAL EDUCATION AND ATHLETICS

Through competition in athletics and through instruction in classes in physical education the Department of Physical Education attempts to balance the intellectual and mental progress of the students by developing proper health habits, by promoting better physical development, and by inspiring high ideals of sportsmanship.

Physical education and athletics are under the supervision of the Head of the Physical Education Department, who is also Faculty Director of Athletics.

Physical Education

All members of the freshman class are required to take a course in physical training conducted in the gymnasium under the direction of an instructor in physical education. Two periods per week for the entire first year are devoted to this work. At the beginning of the year a full record is made of the physical examinations carried on by the instructor and a reputable physician that proper and beneficial exercise may be prescribed.

The object is to give general instruction in the care and strengthening of the body, and to so guide the students that they may continue to give proper thought to their physical training that their mental development may have its greatest effect.

Proper gymnasium clothing is required and all students must take a shower bath following each exercise.

Athletic Association

All students, by virtue of payment of the student athletic tax, are members of the Athletic Association and are represented by an executive council of sixteen, consisting of the president and athletic representative from each of the four classes, the captains and managers of the three varsity sports, and one representative each from the Pickout and the Textile Players. This Council acts as an advisory body to the Athletic Director, has charge of social and athletic events run by the Athletic Association, and ratifies the awarding of letters and appointment of student managers in the various sports.

The schedules of all sports are arranged with the interest of both the Institute and the individual members of the teams in mind. Admission to all home contests is included in the athletic fee which is paid by each student at the time of registration.

Teams are regularly maintained in varsity football, basketball, and baseball. Recently Textile has been represented by tennis and golf teams and by a junior varsity basketball team. Intramural competition is provided by interclass and interfraternity competition.

SUBJECTS OF INSTRUCTION

In the column headed "Hours of Exercise" the numbers represent for each particular subject the total hours required in school for a period of fifteen weeks.

The letter and number which follow the subjects indicate the department in which the subject is given and the number of the subject in that department. For detailed description of the same, see page 34.

The departments are indicated as follows:—

Textile Engineering	B	Cotton Yarns and Knitting	F
Chemistry and Textile Coloring	C	Woolen and Worsted Yarns	G
Textile Design and Power Weaving	D	Finishing	H
Languages and History	E		

By referring to the letter and number indicated under "Preparation" the student can ascertain what subjects are necessary in order that he may have a clear understanding of the subject which he is scheduled to take.

FIRST YEAR

First Term

(Common to all Courses)

	Hours of Exercise
Elementary Inorganic Chemistry C-10	105
English E-10	45
Mathematics B-10	60
Mechanical Drawing B-13	135
Physics B-11	75
Physical Education	30
Textile Design and Cloth Analysis D-10	75

Second Term

	Course IV	Course VI
Elementary Inorganic Chemistry C-10	30	30
Elementary Organic Chemistry C-11	45	45
Elementary German E-11	30	—
English E-10	45	45
Machine Drawing B-13 or B-13a	45	135
Mathematics B-10	60	60
Mechanism B-12	60	60
Physical Education	30	30
Qualitative Analysis C-12 or C-12a	150	45
Stoichiometry C-13	30	—
Textile Design and Cloth Analysis D-10	—	75

For second-term subjects in Courses I, II, and III, see pages 21, 23, 25.

Course I.—Cotton Manufacture

The Cotton Manufacturing Course is intended for students contemplating a career in the manufacture of yarns or fabrics of cotton or the new synthetics processed after the methods used for cotton. As over eighty per cent of the textile fibers consumed in the United States is cotton, it is the policy of the Cotton Department to give the student a thorough course of instruction in handling cotton first. Later, the adaptation of cotton machinery to handle rayon, wool or other fibers is carefully covered. Throughout the work on cotton carding and spinning, reference is made to the possibilities of handling the various rayons, wools or mixes and usually one or more small lots are processed in the laboratory.

During the first term the studies are common to all courses, and include instruction in mathematics, mechanical drawing, physics, textile design and elementary chemistry.

During the second term, lectures in organic chemistry are given followed by lectures in textile chemistry and dyeing the second year. The work in mechanism serves as a basis for all future machine and mechanical work, and is followed by steam engineering, electricity and mill engineering. The course in textile designing, cloth analysis and cloth construction includes lectures on plain, fancy and Jacquard weaves, the analysis of all commercial fabrics, and designs for the same.

The instruction in cotton carding given in the second year covers the production of cotton throughout the world, the classing of various cottons and the various methods of marketing the cotton crop with particular emphasis given to the American cotton crop. The treatment of cotton in the mill processes covers all the operations preparatory to spinning, for the regular cotton system and for the cotton waste systems. Lectures supplement the material available in specially prepared text books. This makes possible instruction regarding the very newest developments in the industry as well as for standard methods and equipment. Considerable time is spent in the laboratory studying cotton fibers, classing, processing stock and making various tests on the adjustment of machines and the effect on the quality of the work produced.

The third year's work continues that of the second year, with detailed study of spinning, spooling, twisting and winding. Another course gives instruction in mill organization, balancing and arranging machinery in the mill. Finally, a brief course is given in the use of the microscope and camera in studying various problems in cotton manufacture. Laboratory practice supplements the lecture course, giving practical operation, adjustment and observation of the machines studied. Advanced laboratory work illustrates the methods of study and analysis of the more general and complex problems such as are usually handled in the laboratory of a textile plant.

Power weaving is taken up during the second and third years. Commencing with lectures and practice upon plain looms, the instruction continues with dobby, box-loom, and Jacquard weaving.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines. Instruction in the finishing of cotton fabrics is given by lectures and laboratory work, and requires considerable work on standard machines in the laboratory. Textile testing, also given in the third year, instructs the student in standard methods for physical testing of textile material.

During both the second and third years, particular attention is given to the preparation of the various reports in order that the student may learn proper methods for presenting data and conclusions resulting from mill studies and tests.

During the third year, each student makes some original study, usually of a technical nature. He must make a formal report of this study satisfactory to the faculty before receiving his diploma.

For detailed description of the subjects see page 32.

Course I.—Cotton Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	30
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	135	Textile Design and Cloth Analysis D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Color D-33	15	Steam Engineering B-24	30
Cotton Carding F-20	225	Textile Chemistry and Dyeing Lect. C-20	30
Cottons D-22	15	Textile Design and Cloth Construction D-20	90
Physics B-23a	45		
Power Weaving D-24	75		

SECOND YEAR. SECOND TERM

Cotton Carding F-21	195	Textile Chemistry and Dyeing Lect. C-20	30
Cotton Waste Processing F-23	30	Textile Design and Cloth Construction D-20	75
Physics B-23a	45		
Power Weaving D-24	150		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Mill Engineering B-34a	30
Cotton Organization F-34	60	Power Weaving D-32	165
Cotton Quality Control F-33	15	Staple Fiber Manufacture F-33	15
Cotton Spinning F-30	105	Textile Testing G-31	30
Electricity B-31a	30	Thesis F-35.	

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Power Weaving D-32	120
Cotton Winding and Twisting F-31	225	Thesis F-35.	
Knitting FK-30	105		

Course II.—Wool Manufacture

The course on wool manufacturing is arranged for those who contemplate a career in the manufacture of woolen or worsted fabrics, and can devote but three years to the school work. It includes instruction on all of the varied processes employed in manipulating the wool fiber to produce yarn and cloth, namely, sorting, scouring, carding, combing, spinning, designing, weaving, dyeing and finishing. The work is carried on by lectures, recitations and practical work in the laboratories.

Beginning with the second year the details of manipulating wool from the grease to the finished yarn is taken up for close study. This includes the spinning of woolen yarn, also worsted yarn, by both the English and the French systems. The intermediate processes of sorting, scouring, carding, combing and top-manufacturing are taken in detail and in proper sequence. Instruction in the production and manipulation of re-worked wool is also included.

The general chemistry of the first year is followed by a lecture course in the second year on textile chemistry and dyeing.

Textile design, cloth analysis and construction are continued from the first year throughout the course, the work being applied especially to woolen and worsted goods. Weaving on power looms commences in the second year and continues through the third.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines.

Lectures on finishing commence with the third year and are augmented by extensive practice with the machines in the Finishing Department.

Work in the Engineering Department extends throughout all three years, and includes mechanical drawing, steam engineering and electricity. The practical application of the principles studied in these subjects is brought out forcibly in the work on mill engineering, where mill design and construction are considered. A short course covering methods employed in the testing of fibers, yarns, and cloths, together with laboratory work in the manipulation of certain physical apparatus, is given in the third year.

For detailed description of the subjects see page 32.

Course II.—Wool Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry		Mechanism B-12	60
C-10	30	Physical Education	30
Elementary Organic Chemistry C-11	45	Qualitative Analysis C-12a	45
English E-10	45	Textile Design and Cloth Analysis	
Machine Drawing B-13	135	D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Color D-33	15	Textile Chemistry and Dyeing	
Fiber Preparation G-20-21	240	Lect. C-20	30
Physics B-23a	45	Textile Design and Cloth Construc-	
Power Weaving D-24	75	tion D-21	90
Steam Engineering B-24	30		

SECOND YEAR. SECOND TERM

Fiber Preparation G-20-21	255	Textile Chemistry and Dyeing	
Physics B-23a	45	Lect. C-20.	30
Power Weaving D-24	120	Textile Design and Cloth Construc-	
		tion D-21	75

THIRD YEAR. FIRST TERM

Electricity B-31a	30	Textile Testing G-31	30
Knitting FK-30	105	Woolen and Worsted Finishing	
Mill Engineering B-34a	30	H-30	75
Power Weaving D-32	45	Worsted Yarn Manufacture G-30	210

THIRD YEAR. SECOND TERM

Power Weaving D-32	195	Worsted Yarn Manufacture G-30	255
Woolen and Worsted Finishing		Thesis.	
H-30	75		

Course III.—Textile Design

The general course in textile design is planned to meet the demand of young men for a technical training in the general processes of textile manufacturing, but with particular reference to the design and construction of fabrics. To this end a foundation is laid in the first year by instruction in the elementary principles of designing, decorative art and weaving. That he may later in the course pursue to advantage instruction in yarn manufacturing, weaving, dyeing, finishing and some engineering problems, a foundation course in mechanics, mathematics and chemistry is laid. As the student is required to pursue courses in the yarn departments, both cotton and wool, he acquires a knowledge of the manufacture of cotton yarns from the bale to the yarn, and of woolen and worsted yarns from the fleece through the varied processes of manufacturing woolen yarn or worsted yarn by both the French and Bradford systems.

Throughout his entire course he receives instruction in design, cloth analysis and construction of all the standard cloths, viz., trouserings, coatings, suitings, blankets, velvets, corduroys, plushes, etc. This is followed by advanced work in Jacquard designing and weaving, which serves not only to acquaint the student with the many kinds of cotton, woolen, worsted and silk fabrics of figured design, but stimulates and develops any artistic talent he may possess. Decorative art becomes an important part of the work of the second and third years.

The courses of freehand drawing, perspective, historic ornament and color serve as means in applying the instruction received in principles of design and textile styling to a better understanding of fashion trends and the changing designs that follow these. The actual pattern drafting and making of garments may be developed to a limited extent as time and individual skill permits.

The course in general inorganic and organic chemistry of the first year leads to the subject of textile chemistry and dyeing in the second year.

Power weaving commences with the second year and continues throughout the course, and work on all types of looms is required.

During the third year the student receives instruction in the finishing of cotton goods and woolen and worsted cloths. This instruction is given by means of lecture and laboratory work.

The engineering subjects given in the second and third years are intended to acquaint the student with such general knowledge as will be of assistance should he be called upon in later life to be a mill manager, or should his subsequent progress lead to some executive position in the operation of a textile plant.

For detailed description of the subjects see page 32.

Course III.—Textile Design

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	30
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	135	Textile Design and Cloth Analysis D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Cotton Carding F-20b	90	Steam Engineering B-24	30
Color D-33	30	Textile Chemistry and Dyeing Lect. C-20	30
Physics B-23a	45	Textile Design and Cloth Construction D-20, 21	165
Power Weaving D-24	90		
Principals of Design D-34	45		

SECOND YEAR. SECOND TERM

Cotton Carding F-21b	60	Textile Chemistry and Dyeing Lect. C-20	30
Color D-33	30	Textile Design and Cloth Construction D-20, 21	135
Fiber Preparation G-20-21	90		
Physics B-23a	45		
Power Weaving D-24	135		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Textile Testing G-31	30
Cotton Spinning F-30b	60	Woolen and Worsted Finishing H-30	75
Power Weaving D-32	60	Worsted Yarn Manufacture G-30	90
Textile Design and Cloth Construction D-30	135		

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Textile Design and Cloth Construction D-30	75
Cotton Winding and Twisting F-31b	60	Woolen and Worsted Finishing H-30	75
Jacquard Design D-23	30	Worsted Yarn Manufacture G-30	90
Power Weaving D-32	120	Thesis.	

Course IV.—Chemistry and Textile Coloring

The four-year course in Chemistry and Textile Coloring, leading to the degree of B.T.C., is especially intended for those who wish to engage in any branch of textile chemistry, textile coloring, bleaching, finishing or the manufacture and sale of the dyestuffs or chemicals used in the textile industry. The theory and practice of all branches of dyeing, printing, bleaching, scouring and finishing are taught by lecture work supplemented by a large amount of experimental laboratory work and actual practice in the dyehouse and finishing room.

The underlying theories and principles of chemistry are the same, no matter to what industry the application is eventually made. Furthermore, no industry involves more advanced and varied applications of the science of chemistry than those of the manufacture and application of the coal-tar coloring matters. In addition, the textile colorist must consider the complex composition of the textile fibers, and the obscure reactions which take place between them and the other materials of the textile industry.

During the first year general chemistry, including both inorganic and organic, is taught by lectures and laboratory work, and this is supplemented during the second term by qualitative analysis and stoichiometry.

Advanced inorganic chemistry, as well as advanced organic chemistry, is studied during the second and third year as a continuation of the elementary chemistry of the first year, and much time is spent upon quantitative analysis, industrial chemistry, and textile chemistry and dyeing.

The foundation work in general chemistry is continued during the third year with courses in physical chemistry, organic laboratory work and analytical work. The subject of industrial chemistry is introduced, and much time is devoted to advanced textile chemistry, dye testing, color matching, calico printing, and woolen, worsted and cotton finishing.

The fourth year is characterized by an endeavor to present certain subjects of a more applied nature in such a manner that the student's reasoning power and ability to apply the knowledge gained during the first three years may be developed to the fullest extent. The subject of engineering chemistry is introduced, and the work in the dyeing and analytical laboratories is applied as far as possible to the actual requirements of the factory chemist and colorist. Much time is also spent in the organic chemistry laboratory, particular attention being given to the preparation of typical dyestuffs. Thorough courses are given in microscopy, photomicrography and the use of various instruments such as the spectroscope, ultra-microscope, polariscope, tintometer and other optical instruments applicable to experimental work in connection with the textile industry. Courses are also given in report writing and textile literature.

During this fourth year the student has an opportunity to take several elective subjects of an advanced nature and conduct such research work and original investigation as time may permit.

For detailed description of the subjects see page 32.

Course IV.—Chemistry and Textile Coloring

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Advanced German E-21	45	Quantitative Analysis C-23	130
Organic Chemistry C-22	30	Stoichiometry C-24	15
English E-20	30	Textile Chemistry and Dyeing	
Mathematics B-20a	60	Lab. C-21	90
Physics B-23	65	Textile Chemistry and Dyeing	
Power Weaving D-24a	15	Lect. C-20	45

SECOND YEAR. SECOND TERM

Advanced German E-21	45	Stoichiometry C-24	15
Organic Chemistry C-22	30	Textile Chemistry and Dyeing	
English E-20	30	Lab. C-21	120
Physics B-23	65	Textile Chemistry and Dyeing	
Quantitative Analysis C-23	175	Lect. C-20	45

THIRD YEAR. FIRST TERM

Organic Chemistry C-34	15	Physical Chemistry C-33	45
Adv. Textile Chemistry and Dye-		Quantitative Analysis C-30	150
ing Lab. C-32	135	Technical German C-35	30
Adv. Textile Chemistry and Dye-		Woolen and Worsted Finishing	
ing Lect. C-32	30	H-30	75
Economics E-30	45		

THIRD YEAR. SECOND TERM

Adv. Textile Chemistry and Dye-		Physical Chemistry C-33	45
ing Lab. C-32	180	Quantitative Analysis C-30	105
Adv. Textile Chemistry and Dye-		Technical German C-35	30
ing Lect. C-32	15	Woolen and Worsted Finishing	
Economics E-30	45	H-30	75
Industrial Chemistry C-31	30		

FOURTH YEAR. FIRST TERM

Adv. Textile Chemistry and Dye-		Electives or Thesis C-52	90
ing Lab. C-44	75	Organic Laboratory C-41	75
Adv. Textile Chemistry and Dye-		Quantitative Analysis C-46	15
ing Lect. C-44	30	Report Writing C-47	15
Chemical Textile Testing C-43	45	Seminar in Business English E-40	15
Colloid Chemistry C-50	30	Technical German C-40	15
Industrial Chemistry C-42	30	Textile Marketing B-42	30
Microscopy and Photomicroscopy			
C-45	60		

FOURTH YEAR. SECOND TERM

Advanced General Chemistry C-49	30	Organic Laboratory C-41	105
Adv. Textile Chemistry and Dye-		Rayon Manufacturing C-51	15
ing Lab. C-44	150	Technical German C-40	15
Adv. Textile Chemistry and Dye-		Technology of Wool Manufacture	
ing Lect. C-44	15	Fibers G-40	15
Chemical Textile Testing C-43	60	Textile Literature C-48	30
Electives or Thesis C-52	90		

Course VI.—Textile Engineering

This course is the four-year general textile course leading to the degree of Bachelor of Textile Engineering (B.T.E.), and aims especially to fit men, in the broadest possible manner, to meet the increasing demands of every branch of the textile industry for men with combined textile and technical preparation. The magnitude and scope of the textile and allied industries fully justify the most thorough technical training possible for all who aspire to leadership in this field.

The course is planned so as to provide a foundation in those subjects which are essential to the training of an engineer, coupled with a thorough understanding of textile processes and materials. Such subjects as mathematics, physics, chemistry, drawing, mechanics and mechanism, provide for the first objective. The second is secured by a study of cotton, woolen and worsted yarn manufacturing, textile designing, weaving, knitting, dyeing, and finishing. Instruction is by means of lectures, recitations and laboratory work.

A large proportion of the student's time is spent in well equipped textile departments where he is familiarized with the machinery and processes used in the conversion of cotton and wool fibers into yarns and finished fabrics. The subjects of textile testing and microscopy acquaints the student with the methods for determining the physical properties of textile fibers, yarns and fabrics.

To properly equip the student to meet the varied engineering problems which confront the mill manager or executive, or to so train him that he may enter those industries closely allied to the textile, instruction is given by lecture and laboratory practice in the several branches of engineering. Steam engineering considers the problems involved in steam generation and distribution for power, heating and manufacturing purposes, and includes the testing of laboratory and power plant equipment. The course in electrical engineering treats of the generation and transmission of electrical power, the testing of direct and alternating current machinery, and is intended to acquaint the student with modern practice. Mill engineering familiarizes the student with factory design, construction, heating, lighting, humidification, fire protection, and the arrangement of machinery and buildings for most efficient production and economical power distribution.

The broadening effect of such subjects as English and economics is carried still further in this course by carefully planned courses in business administration, accounting, cost accounting and business law.

During the fourth year the student is required to conduct an original investigation of some textile or allied problem, and to submit the results in the form of a satisfactory thesis before receiving his degree.

The Cotton and Wool Options of the Textile Engineering course have been provided for those students who may desire the breadth of technical training which this course offers but who wish to specialize in either cotton or wool manufacturing. In these optional courses the student's entire time is devoted to the study of that particular fiber which he elects. A demand from the distributing and marketing divisions of the textile industry for properly trained men has led to the establishment of the Sales Option of the Textile Engineering course. This is patterned after the General Course but with more time devoted to such subjects as selling, advertising, marketing, foreign trade and the like. There have also been requests for a four-year degree course in which the design of textile materials should receive the greater emphasis. For this purpose the Design Option of the Textile Engineering course is offered, which, while majoring in textile design, includes other subjects that make a broader course than the one of shorter duration.

In the General Option some recognition is given to those who may wish to lay more emphasis on knit fabrics. This is done by the substitution of knitting laboratory time for a portion of that assigned to weaving laboratory and is dependent on the possibility of arranging for such special cases.

For detailed description of subjects, see page 32. The curricula of the several optional courses will be found on pages 27 to 31.

Course VI.—Textile Engineering (General Course-G)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20b	75	Physics B-23	75
Fiber Preparation G-20, 21	120	Textile Chemistry and Dyeing	
Machine Drawing B-21.	45	Lecture C-20	30
Machine Shop B-26	75	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-22	45

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Mathematics B-20	60
Cotton Carding F-21b	75	Physics B-23	75
Electives F-25		Power Weaving D-24	75
Fiber Preparation G-20, 21	90	Textile Chemistry and Dyeing	
Machine Drawing B-21.	75	Lect. C-20	30

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Spinning F-30b	60	Power Weaving D-32	60
Economics E-30	45	Worsted Yarn Manufacture G-30.	90
Electives F-35		Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Mill Engineering B-34	90
F-31b	60	Worsted Yarn Manufacture G-30.	90
Economics E-30	45	Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75
Heat Engineering B-33	90		

FOURTH YEAR. FIRST TERM

Accounting B-40	90	Textile Marketing B-42'	30
Cotton Organization F-34	60	Textile Microscopy B-41	45
Cotton Laboratory F-40	30	Textile Testing B-43	75
Electrical Engineering B-44	75	Thesis	75
Mill Engineering B-45	45		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Knitting FK-30a	30
Cotton Finishing H-31	105	Mill Engineering B-45	75
Electives B-48 or F-45		Mill Illumination B-47	45
Electrical Engineering B-44	75	Thesis	105

Course VI.—Textile Engineering (Cotton Option-C)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20a	165	Textile Chemistry and Dyeing	
Cottons F-22	15	Lecture C-20	30
Machine Drawing B-21	90	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-20	90
Physics B-23	75		

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Power Weaving D-24	60
Cotton Carding F-21a	105	Textile Chemistry and Dyeing	
Cotton Waste Processing F-23	30	Lect. C-20	30
Machine Drawing B-21	45	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-20	75
Physics B-23	75		

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Quality Control F-32	15	Machine Shop B-26	45
Cotton Spinning F-30a	150	Power Weaving D-32	60
Economics E-30	45	Staple Fiber Manufacture F-33	15
Electrical Engineering B-31	75		

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Heat Engineering B-33	90
F-31a	180	Mill Engineering B-34	90
Economics E-30	45	Power Weaving D-32	45
Electrical Engineering B-31	75		

FOURTH YEAR. FIRST TERM

Accounting B-40	90	Textile Marketing B-42	30
Cotton Organization F-34	60	Textile Microscopy B-41	45
Cotton Laboratory F-40	45	Textile Testing B-43	75
Electrical Engineering B-44	75	Thesis	75
Mill Engineering B-45	30		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Mill Engineering B-45	30
Cotton Finishing H-31	105	Mill Illumination B-47	45
Electrical Engineering B-44	75	Thesis	75
Knitting FK-30	105		

Course VI.—Textile Engineering (Wool Option-W)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Fiber Preparation G-20, 21	225	Mathematics B-20	60
Machine Drawing B-21	90	Physics B-23	75
Machine Shop B-26	45	Textile Chemistry and Dyeing Lecture C-20	30

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Physics B-23	75
Fiber Preparation G-20, 21	195	Power Weaving D-24	75
Machine Drawing B-21	45	Textile Chemistry and Dyeing Lect. C-20	30
Mathematics B-20	60		

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Power Weaving D-32	60
Economics E-30	45	Worsted Yarn Manufacture G-30 .	150
Electrical Engineering B-31	75	Woolen and Worsted Finishing H-30	75
Heat Engineering B-32	75		

THIRD YEAR. SECOND TERM

Economics E-30	45	Worsted Yarn Manufacture G-30 .	150
Electrical Engineering B-31	75	Woolen and Worsted Finishing H-30	75
Heat Engineering B-33	90		
Mill Engineering B-34	90		

FOURTH YEAR. FIRST TERM

Accounting B-40	90	Textile Marketing B-42	30
Electrical Engineering B-44	75	Textile Microscopy B-41	45
Mill Engineering B-45	30	Textile Testing B-43	75
Textile Design and Cloth Construc- tion D-21	75	Thesis	105

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Mill Illumination B-47	45
Electrical Engineering B-44	75	Textile Design and Cloth Construc- tion D-21	75
Knitting FK-30	105	Thesis	105
Mill Engineering B-45	30		

Course VI.—Textile Engineering (Design Option-D)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20c	60	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	90	Lecture C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	165
Principles of Design D-34	45		

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Power Weaving D-24	75
Fiber Preparation G-20, 21	90	Textile Chemistry and Dyeing	
Mathematics B-20	60	Lect. C-20	30
Physics B-23	75	Textile Design and Cloth Construc-	
Knitting FK-20	30	tion D-20, 21	105

THIRD YEAR. FIRST TERM

Color D-33	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30	105
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Knitting FK-31	45	Woolen and Worsted Finishing	
Power Weaving D-32	75	H-30	75

THIRD YEAR. SECOND TERM

Color D-33	45	Textile Design and Cloth Construc-	
Cotton Winding and Twisting F-31b	60	tion D-30	75
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Power Weaving D-32	105	Woolen and Worsted Finishing	
Principles of Design D-34	30	H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40	90	Textile Microscopy B-41	45
Jacquard Design and Weaving D-40	90	Textile Styling B-50	30
Textile Design and Cloth Construc-		Textile Testing B-43	75
tion D-41	75	Thesis	90
Textile Marketing B-42	30		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Textile Design and Cloth Construc-	
Cotton Finishing H-31	105	tion D-41	90
Jacquard Design and Weaving D-40	105	Thesis	135

Course VI.—Textile Engineering (Sales Option-S)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20b	75	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	105	Lecture C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	180

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	90	Lect. C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	105
Power Weaving D-24	105		

THIRD YEAR. FIRST TERM

Color D-33	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30	105
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Power Weaving D-32	75	Woolen and Worsted Finishing	
Principles of Marketing B-35	45	H-30	75

THIRD YEAR. SECOND TERM

Color D-33	45	Statistics B-53	45
Cotton Winding and Twisting		Textile Design and Cloth Construc-	
F-31b	60	tion D-30	75
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Marketing Methods B-36	60	Woolen and Worsted Finishing	
Power Weaving D-32	30	H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40	90	Textile Microscopy B-41	45
Principles of Selling and Advertis-		Textile Styling B-50	30
ing B-49	105	Textile Testing B-43	75
Selling Policies B-52	45	Thesis	90
Jacquard Design and Weaving			
D-40	45		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Knitting FK-30b	75
Cotton Finishing H-31	105	Selling Policies B-52	45
Foreign Trade and Economic Geog-		Thesis	165
raphy B-51	45		

SUBJECTS OF INSTRUCTION

TEXTILE ENGINEERING DEPARTMENT—B

The various options are designated by G, C, W, D, S.

Mathematics—B-10. Preparation: Admission Requirements. The work in the first term consists of algebra, plane trigonometry, and instruction in the use of the slide-rule. Algebra is reviewed through quadratics and then logarithms are taken. In plane trigonometry, right and oblique triangles are solved by means of natural and logarithmic functions, and the various algebraic relations among the trigonometric functions are proved and used in identities and equations. Significant figures and the use of approximate data in calculations are also discussed.

In the second term the following topics are taken up: graphical and mathematical solution of quadratic and simultaneous equations, theory of equations, partial fractions, Napierian logarithms, equations of the straight line, equations of various curves, differentiation and integration of algebraic functions, and applications. [All courses.]

Physics—B-11. Preparation: Admission Requirements. Taken simultaneously with B-10. This subject is required as a necessary preparation for all courses, and is given during the first term of the first year. The fundamental principles of this subject are considered absolutely essential to a thorough understanding of the operation of all machinery, textile or otherwise. Some of the topics treated in this course are linear and angular velocity, uniform and accelerated motion, mass, momentum, inertia, effect of force in producing motion, centrifugal force, work, power, energy, principle of moments and its applications, parallelogram and triangle of forces with applications, resolution and composition of forces, the mechanical principles represented by the wheel and axle, differential pulley block, common pulley blocks, jackscrew, worm and wheel, inclined plane, hydrostatics, elements of hydraulics, kinetic energy, circular motion and harmonic motion.

LABORATORY. This course is supplementary to the lecture course and gives the student an opportunity to apply the knowledge gained in the lecture course by performing various experiments. [All courses.]

Mechanism—B-12. Preparation: B-10 and B-11. This subject is also deemed to be one of those absolutely essential to every student's preparation for the work of the following years. Whereas the principles studied are of general application, textile machinery in particular furnishes an unusually large variety of specific examples, and frequent reference is made to these in the development of the course. Some of the important topics covered are gearing and gear train design, belting and pulley calculations, cone and stepped pulley design, cam design, linkages, epicyclic gear trains, and intermittent motion devices. [All courses.]

Mechanical Drawing—B-13. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is taken during the first year and consists of work in the drawing room supplemented by lectures. This subject is considered of the greatest importance as a preparation for the student's future work, and the practical usefulness of drawing of this character is fully emphasized.

This course is systematically laid out covering in order the following divisions:—care and use of drawing instruments; lettering; geometrical constructions; orthographic projection; isometric projection; cross sections; dimensioning; sketching practice on machine details; working drawings; tracing and blueprinting; developments with practical application. [Courses I, II, III, VI.]

Machine Drawing—B-13a. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is similar to B-13, but not so extensive, and is given to students electing the Chemistry and Textile Coloring course. [Course IV.]

Mathematics—B-20. Preparation: B-10. This subject is a continuation of the first year subject B-10, and extends throughout the second year of the engineering course. In the first term the following topics are treated:—exponential functions, the circle, parabola, ellipse, hyperbola, polar coordinates, indefinite

integrals, summation by integration and applications of integration. In the second term the topics are: differentiation of transcendental functions; methods of integration, centers of gravity, moments of inertia, empirical formulas, and nomographic charts. [Course VI.]

Mathematics—B-20a. Preparation: B-10. This subject is a continuation of the work of the first-year subject B-10. A study of the derivatives and differentials is followed by applications of the differential to rates and errors. Other topics treated are the circle, parabola, ellipse, hyperbola, indefinite integrals, summation by integration, areas, volumes, pressures, exponential, logarithmic, and trigonometric functions. [Course IV.]

Machine Drawing—B-21. Preparation: B-10, B-12, B-13. The work in Machine Drawing is devoted to working detail drawings of textile machinery and advanced graphical mechanism problems. In every case the data for all of these problems are taken directly from some of the textile machines that the students use in other departments. [Course VI, Options G, C, W.]

Physics—B-23. Preparation: B-10 and B-11. This subject lays the foundation for later work in engineering and chemistry and also explains the general application of the laws and principles of physics. Instruction, consisting of lectures, demonstrations, and recitations, is given for three hours per week during the second year. The topics taken up the first term are:—wave motion and sound, thermometry, measurement of heat, change of state, expansion, transfer of heat, humidity, nature and propagation of light, and photometry.

The second term is devoted to the study of light, magnetism, and electricity. Some of the topics are:—reflection and refraction, lenses, the telescope and microscope, the spectroscope, color sensation, double refraction, magnetism, electrostatics, fundamental laws of direct currents and electrolysis.

LABORATORY. A two-hour period per week for Course VI and a three-hour period every alternate week for Course IV accompanies the class work in this subject and is planned to illustrate precise methods for measuring various physical quantities. [Courses IV, VI.]

Physics—B-23a. Preparation: B-10 and B-11. This subject consists of the same topics as B-23 but does not contain any laboratory work. [Courses I, II, III.]

Steam Engineering—B-24. Preparation: B-12. This course consists of thirty lectures given in the first term of the second year. Its aim is to give those students who do not take the Textile Engineering Course a general knowledge of thermodynamics, the steam engine, steam turbine and gas engine and their auxiliaries, and waste heat reclamation. [Courses I, II, III.]

Applied Mechanics—B-25. Preparation: B-11, B-20. This course is divided into two parts: Graphic Statics and Strength of Materials. The first eight weeks of the semester which is devoted to Graphic Statics consists of the study of mathematical and graphical solutions for any system of forces. Centers of gravity and funicular polygons are introduced followed by roof and bridge truss problems under various conditions of dead, live, wind, and snow loading.

During the second half of the semester and during all the following semester, this course deals with Strength of Materials. So far as time permits, such topics as stress, strain, methods of testing materials, bending moments, shearing force, beam design, torsion, design of shafts, compound beams and columns, combined stresses, and like subjects are considered.

This subject is preparatory to the work in Mill Engineering of both the third and fourth years, at which time its practical value and application are clearly demonstrated. [Course VI, Options G, C, W.]

Machine Shop Practice—B-26. Preparation: B-11 and B-12. Systematic instruction is given in the most approved methods of machine shop practice, the object being to familiarize the student with the proper use of hand and machine tools, and the characteristics of the different materials worked. Particular attention is given to the form, setting, grinding and tempering of tools and the mechanism of the different machines involving certain speeds, feeds, etc. The course is so planned that the instruction in each typical operation shall conform as nearly as

possible to commercial machine-shop practice on textile machinery. The list of tools which appears under "Equipment" in this Bulletin gives an idea of the scope of the work, which includes chipping and filing, tool grinding and tempering, straight and taper turning, screw cutting, drilling and boring, planer work, milling machine work, including gear cutting. [Course VI, Options G, C, W.]

Applied Mechanics—B-30. Preparation: B-25. This is a continuation of Applied Mechanics B-25, and is given during the first term of the third year. [Course VI, Options G, C, W.]

Electrical Engineering—B-31. Preparation: B-23. The elementary principles of electricity and magnetism are considered in the lecture course on physics. Their development and application are taken up in this course in a detailed study of the magnetic and electric circuits during the first period of the first term. The second period is devoted to a study of the principles of direct current machinery. The laboratory work consists of a study of technical electrical measurements and dynamo-electric machinery, determining for the latter their operating characteristics.

The second term is devoted entirely to a study of the principles of alternating current circuits, including vector representation, effective values, power, series and parallel circuits. The laboratory work consists of a study of technical electrical measurements, some meter calibration including that of watt-hour meters and a study of alternating current circuits using electrical measuring instruments. [Course VI, Options G, C, W.]

Electricity—B-31a. Preparation: B-23a. This is a short course given in the third year of the manufacturing courses, and consists of thirty lectures covering briefly and in a general way the theory of direct and alternating current generators and motors. [Courses I, II.]

Heat Engineering—B-32. Preparation: B-12, B-20. The purpose of this course is to familiarize the student with the principles of elementary thermodynamics, the properties of steam, mechanical mixtures and combustion of fuels. The course consists of thirty exercises given in the first term of the third year. The lectures and recitations are supplemented with illustrative problems assigned for home preparation.

LABORATORY. The principles underlying the subjects of steam engineering, hydraulics and thermodynamics are demonstrated in a practical manner in the work in the Engineering Laboratory, given three hours per week. Greater importance is attached to the development of initiative and responsibility in the student than the mere accomplishment of a large number of carefully planned tests. The character of this work is indicated by the following list of experiments and tests:—

Calibration of scales, tanks, gauges, inductors and counters; barrel, separating and throttling calorimeter tests; heat exchange tests; boiler inspection and measurement; flue gas analysis; dynamometer tests; ejector and injector tests; Rankin's efficiency, actual thermal efficiency and duty tests; expansion of pipes, radiation and pipe covering tests; boiler test; trap tests, feed water heating tests; steam, triplex and centrifugal pump tests. [Course VI, Options G, C, W.]

Heat Engineering—B-33. Preparation: B-32. This course is a continuation of B-32, and consists of forty-five hours of lectures and recitations given in the second term of the third year of the Textile Engineering course. The subjects developed are the kinematics of reciprocating steam engines, steam turbines and gas engines. Special attention is given to the mechanical principles on which the steam engine operates, with detail discussion of the valve gear and governing devices, and the various diagrams used for studying the same. Consideration is given to the underlying heat theory and to the details of construction of the various parts of the machines. During the latter part of the course the historical development, classification and types of turbines and gas engines are discussed.

LABORATORY. The character of the work in the Engineering Laboratory, given three hours per week during the second half of the third year, is indicated by the following list of experiments:—

Boiler inspection and measurement; Rankin's efficiency, actual thermal efficiency and duty tests; boiler test; valve setting by measurement and by indicator; condenser test; non-condensing and condensing engine and turbine tests; heating and ventilating fan tests; lap and butt riveted joint test; nozzle test; gas engine test; flow of air and air compressor tests. [Course VI, Options G, C, W.]

Mill Engineering—B-34. Preparation: B-21, B-25. Mill Engineering, as presented in thirty lectures during the third year of the Textile Engineering course, consists of a discussion of the following topics: the investigation of the subsoils for the footing course of the foundation; building materials; design of walls, beams, floors, and construction of windows, doors, stairways and roofs.

Sixty hours of drawing-room and laboratory practice are devoted to plane surveying, contour plotting, cut and fill calculations, setting of batter boards, alignments of shafting and the study from blue-prints of slow-burning construction. [Course VI, Options G, C, W.]

Mill Engineering—B-34a. Preparation: B-21. Mill Engineering, as presented in thirty lectures during the third year of the diploma courses, is largely general in its nature and includes only parts of Course B-34. [Courses I, II.]

Principles of Marketing—B-35. An introduction to the basic principles underlying the modern systems of distributing goods with special emphasis on the raw and finished products of the textile industry. The course will cover the history and economic importance and functions in modern distribution of the selling agent, the commission man, the broker, jobber, merchant, factor and other intermediaries as well as the channels that goods may take from the producer to the ultimate consumer. The importance and advantages of each will be studied with special emphasis on the present practice and trends in the textile industry.

Lectures and the case method of instruction will be employed. [Course VI, Sales Option.]

Marketing Methods—B-36. Preparation: B-35. A continuation of the Principles of Marketing. The course will be conducted by means of lectures and case problems and discussions. Some of the subjects studied in detail are,—the planning of marketing campaigns, the fluctuations of price and style, forecasting, the business cycle, quotas, market surveys and research, sales planning and control, industrial marketing, and consumer merchandising.

Considerable time will be devoted to the study of current literature and events in the textile field. [Course VI, Sales Option.]

Accounting—B-40. Preparation: B-10 and E-30. The purpose of this course is to acquaint the student with the principles and modern methods of accounting for mercantile and manufacturing businesses. It is not intended to make him a proficient bookkeeper or accountant, but the nature of the subject necessitates a basic knowledge of double-entry bookkeeping, the functions of ledger accounts, and of the use of checks, drafts, notes, vouchers, etc., in ordinary business transactions. This is developed during the summer preceding the senior year by requiring the student to take a course in double-entry bookkeeping, thus saving valuable time during the school year and effectively preparing the ground for the instruction work.

The first half of the course is based on a study of the proper form and content of the balance sheet and profit and loss statement, the principles and problems involved in the correct valuation of asset and liability items, and the related topics of depreciation, reserves, capital, surplus and dividends.

The second half of the course is devoted to cost accounting and is planned to give the student a knowledge of the best cost methods in use at the present time. It includes a thorough discussion of methods of handling and accounting for raw materials, direct labor, the distribution of overhead expenses, normal costs and their predetermination, budgeting, and cost reports and their use. [Course VI.]

Textile Microscopy—B-41. Preparation: B-23. This subject consists of the study of animal and vegetable fibers by means of the microscope and its accessories. It includes methods of illumination, sectioning and mounting, drawing with the camera lucida, measurements of diameter and twist, precision sectioning, and the use of polarized light in the study and identification of fibers. [Course VI.]

Textile Marketing—B-42. Preparation: E-30. This subject covers the problems of marketing textile products, with particular emphasis upon the ultimate consumer. The course will survey the principal marketing channels and marketing methods. Attention is directed to the possibilities of demand creation and demand control, especially through market and style research. Current changes in marketing organization of the industry will be studied and reviewed. [Courses IV and VI, Options G, C, W, D.]

Textile Testing—B-43. Preparation: B-23, F-30 or G-30, D-32. This course is planned to familiarize the student with the latest methods and devices for determining the physical properties and characteristics of textile fibers, yarns and fabrics. The scope of the work is indicated by the following topics: abrasion, absorptability, atmospheric control, bursting, crimp, heat transmission, porosity, regain, resilience, stretch, tear, tensile strength, thickness, twist, waterproofness, precision of measurements, interpretation and presentation of data. These are treated both from the standpoint of commercial testing and of textile research. One two-hour period per week of testing laboratory work is included in the course. [Course VI.]

Textile Testing—B-43a. Preparation: B-23, F-20 or G-20, D-20 or D-21. This subject is presented in thirty lecture periods during the third year of the diploma courses. It is similar in content to B-43 but less extensive. [Courses I, II, III.]

Electrical Engineering—B-44. Preparation: B-31. During the first term a detailed study of the alternator is made, with particular stress on generation of three-phase currents. Methods of predetermination of alternator regulation are taken up and at least one method compared with laboratory test. Parallel operation of alternators with accompanying instruments and devices are studied in classroom and laboratory. The single phase, three-phase and Scott transformers are considered in turn and their various methods of connecting to line and alternators are systematically studied.

In the second term the induction motor and generator are studied with their particular adaptability to the textile industry. The principal starting devices for this motor are thoroughly taken up. The synchronous motor is studied particularly in relation to its ability to correct power factor. In all the work outlined above, the main features are illustrated profusely in classroom demonstrations and laboratory exercises. [Course VI, Options G, C, W.]

Mill Engineering—B-45. Preparation: B-34. This subject, given in the fourth year of the Textile Engineering course, includes many new topics, and at the same time coordinates much of the student's previous work in engineering with his knowledge of textile processes and their requirements. In detail it takes up a study of modern types of mill buildings and problems involved in their construction. Such matters as factory location, machinery layout, power transmission, heating, ventilation, humidification, fire protection and sanitary facilities are also discussed. The student is finally assigned the problem of completely designing a textile mill building and laying out its machinery and equipment so far as time permits. [Course VI, Options G, C, W.]

Business Administration—B-46. Preparation: B-10 and E-30. Recognizing the importance which executive work plays in the management of an industrial enterprise, this course has been placed in the curriculum of the Textile Engineering course in order to acquaint the student with some of the fundamental problems and principles involved, and possibly to reveal to him some of his own capabilities for this type of work. The broad topics considered are types of business organizations, financing, administration, planning, control, personnel, and human relationships. The importance of applied psychology to successful management is stressed. The student is made familiar with some of the tools of management such as purchasing systems, storeskeeping, perpetual inventories, warehousing methods, scheduling, routing, tracing, time keeping, motion studies, time studies, mnemonic symbolizing, graphical records, and wage systems.

BUSINESS LAW. Under this subject are given lectures, supplemented by the use of a suitable text, on the law governing contracts, sales, agency, partnerships, corporations, negotiable instruments, bailments and carriers, insurance, personal property, real property, suretyship and guaranty, and bankruptcy. [Course VI.]

Mill Illumination—B-47. Preparation: B-23. Because of the demand and the necessity for proper lighting of textile mills, this course is offered three hours per week for one term. It consists of three major parts,—photometry, illumination and installation design. Costs and estimates, safety and production are included.

The laboratory exercises include the study and applications of the photometer, Macbeth Illuminometer and foot-candle meter. The concluding work is a design of a lighting installation for a typical mill room, using the school laboratories for this purpose. [Course VI, Options G, C, W.]

Electives—B-48. Students in the second term of the fourth year of the Textile Engineering course will be permitted to elect certain textile subjects as substitutes for part of the time scheduled for engineering subjects. Thus a student is offered an opportunity for specialized study along such lines as will prove most beneficial to him at that time. The selection of elective studies is subject to the approval of the head of the Textile Engineering department and to the possibility of arranging for the same. [Course VI, Option G.]

Principles of Selling and Advertising—B-49. Preparation: B-36. A comprehensive course dealing with the fundamental principles of advertising and selling. The course will cover the psychology of selling and advertising, the legal restrictions in marketing, advertising technique, copy writing, layout, illustrations, advertising campaigns, packaging, advertising mediums, industrial and consumer advertising, creative salesmanship, personality, types of customers, the selling process, supersalesmanship, etc.

Lectures and the case method of instruction will be used. [Course VI, Sales Option.]

Textile Styling—B-50. Preparation: D-30. This includes fabric names, their distinguishing characteristics, purpose and suitability; study of the costume in line, mass, color and texture; the silhouette, its changes and recurrences as well as influences that in the past have changed costume as an aid to better forecast of fabrics. [Course VI, Options D, S.]

Foreign Trade and Economic Geography—B-51. Preparation: E-30. The course will cover the foreign markets for finished textiles and the American raw fibers, methods of selling employed, foreign commercial law that an American exporter needs, the foreign fibers and textiles and their importance in international trade.

Special emphasis will be given upon costs of foreign marketing, tariffs, international competition, possible markets and methods of building an export business. [Course VI, Sales Option.]

Selling Policies—B-52. Preparation: B-36. This course will cover the development of administrative policies and guiding principles in the marketing, pricing, styling and merchandising of textiles and textile fibers. [Course VI, Sales Option.]

Statistics—B-53. Preparations: B-20. A study of elementary statistics which relate to industry, trade and general business and financial conditions. It includes the analysis, presentation and interpretation of statistical data, index numbers, correlation, law of error, cyclical fluctuations, dispersion, trend and other pertinent topics. [Course VI, Sales Option.]

CHEMISTRY AND DYEING DEPARTMENT—C

Elementary Inorganic Chemistry—C-10. Preparation: Admission Requirements. During the first term of the first year, the class work in this course consists of three lectures, and one recitation per week on fundamental principles, and descriptive chemistry of the non-metallic elements and their compounds. This is accompanied by one afternoon per week of laboratory work, which may be on either inorganic preparations or qualitative analysis, according to the previous laboratory training of the individual student.

In the second term, one lecture and one recitation per week are devoted to the metals and their compounds, and one afternoon per week wholly to qualitative analysis, listed below as C-12. [All courses.]

Elementary Organic Chemistry—C-11. Preparation: Admission Requirements. This course, covered by lectures during the second term, includes a general survey of the fundamental principles of Organic Chemistry, also a study of the hydrocarbons and their derivatives from the point of view of their structure, preparation and uses. This work, although elementary in character, is of sufficient breadth to prepare the student understandingly for the general lectures upon coal-tar dyestuffs which are given in Course C-20. [All courses.]

Qualitative Analysis—C-12. Preparation: C-10, taken simultaneously. This is a continuation of the laboratory study of inorganic compounds, with application to their systematic analysis. It is given ten hours per week to chemists during the second term of the first year. Students with adequate preparation can make further progress by starting this work in place of elementary laboratory exercises during the first term, as indicated under C-10.

When sufficiently advanced, students take up the examination of various products with which the textile chemist must be familiar such as mordanted cloths, pigments and the various dyeing reagents.

SEMI-MICRO QUALITATIVE ANALYSIS.—Qualitative analysis for the more common elements by micro methods, with centrifuge, spot tests, etc. [Course IV.]

Qualitative Analysis—C-12a. Preparation: C-10, taken simultaneously. This course is similar to C-12, but not so extensive, being given three hours per week during the second term. [Courses I, II, III, VI.]

Stoichiometry—C-13. Preparation: C-10, taken simultaneously. Two hours per week during the second term of the first year, on the fundamental principles underlying calculations of quantitative analysis, on the gas laws, and on balancing of chemical equations. [Course IV.]

Textile Chemistry and Dyeing—C-20. Preparation: C-10, C-11, B-12, B-13a. The outline of the lecture course which is given during the second year is as follows:—

TECHNOLOGY OF VEGETABLE FIBERS.—Cotton, linen, jute, hemp, china grass. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ANIMAL FIBERS.—Wool, mohair, silk. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF MANUFACTURED ORGANIC FIBERS.—Study of the various forms of manufactured organic fibers, including the rayons and such other manufactured fibers as nylon, vinyon and lanital, the process of manufacture, their properties and action with chemicals.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching; action of soap.

The bleaching of cotton cloth, yarn and raw stock is studied at length with detailed description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is also included an exhaustive study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods for degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods for detection, their effect during the different operations of bleaching, scouring, dyeing and printing and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds, not dyestuffs, that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting assistants, mordanting principles and leveling agents.

THEORY OF DYEING.—A discussion of the chemical, mechanical, solution and absorption theories, and the various views that have been advanced by different investigators of the chemistry and physics of textile coloring processes.

Under this heading are discussed the general methods of classifying dyestuffs and the definitions of such terms as textile coloring, dyeing, textile printing, substantive and adjective dyestuffs, monogenetic and polygenetic dyestuffs.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, turmeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used within recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown and iron buff.

COAL-TAR COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Special study of basic coloring matters, phthalic anhydride colors, including the eosins and phloxines; acid dyestuffs, Janus, direct cotton, sulphur and mordant colors, including the alizarines and other artificial coloring matter requiring metallic mordants; mordant acid and insoluble azo colors, developed on the fiber; reduction vat colors, aniline black and other artificial dyestuffs not coming under the above heads.

As each class of dyestuffs is taken up, the details of the methods of applying them upon all the different classes of fabrics and in all the different forms of dyeing machines are thoroughly discussed; also the difficulties which may arise in their application, and the methods adopted for overcoming them.

MACHINERY USED IN DYEING.—A certain amount of time is devoted to the description of the machinery used in various processes of textile coloring which is supplemented as far as possible by the use of charts, diagrams and lantern slides.

Most of the important types of dyeing machines are installed within the dye-house of the school, and the students can be taken directly from the lecture room and shown the machines in actual operation. [All courses.]

Dyeing Laboratory—C-21. Preparation: C-20 taken simultaneously. Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and systematic experiments the student learns the nature of the various classes of dyestuffs and their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool, silk and the various types of rayon, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye bath, etc.

Bleaching processes applicable to various animal and vegetable fibres are studied.

Work in color matching is also carried out on a laboratory scale. A fairly extensive study of the fastness properties of representative dyes of each class is taken up as well as their suitability for various classes of work.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines which are described elsewhere.

By the use of a small printing machine the principles of calico printing are illustrated, and by means of the full-sized dyeing machines and vats the practical side of the subject is studied. It is the constant endeavor of those in charge to impart information of a theoretical and scientific character that will be of value in the operation of a dyehouse. [Course IV.]

Organic Chemistry—C-22. Preparation: C-11. The purpose of this course is to lay a broad foundation for the understanding of the basic principles of organic chemistry. The first semester consists of illustrated lectures and recitations covering the aliphatic series. The second term is devoted to the aromatic compounds. A number of problems are assigned as home exercises in order to fix the fundamental principles of the science in the student's mind. Books: Wertheim—Organic Chemistry and E. H. Huntress—Problems in Organic Chemistry. [Course IV.]

Quantitative Analysis—C-23. Preparation: C-12. The object of this course is to teach the fundamental principles of quantitative analysis, and to give the student an opportunity of acquiring skill in manipulating the special apparatus used in analytical procedure.

Typical gravimetric methods are taught the first term. The samples analyzed comprise salts, minerals and ores. Electrochemical analysis is carried out with the aid of a modern type of apparatus designed for rapid work.

The work of the second term consists of volumetric methods. A number of ores and commercial products, carefully chosen, are analyzed so as to give the student a varied experience.

The laboratory work is supplemented by lectures and recitations. Talbot's "Quantitative Chemical Analysis" 1937 Edition is used as a text. [Course IV.]

Stoichiometry—C-24. Preparation: B-10, C-10, C-13. This subject is taken one hour a week during the second year. Calculations of gravimetric analysis are studied the first term, and calculations of volumetric analysis the second term. Hamilton and Simpson's Calculations of Quantitative Chemical Analysis is used as a text. [Course IV.]

Quantitative Analysis—C-30. Preparation: C-23. The fundamental principles acquired in Course C-23 are applied in this course in the examination of materials used in the textile mill, the dyehouse, and the finishing plant. Among the materials analyzed are water, soaps, oils, fuels, and stripping agents. The latest and most practical methods are employed. Mahin's Quantitative Analysis, supplemented by "Analytical Methods for a Textile Laboratory" (as printed in the Year Book of the American Association of Textile Chemists and Colorists) is used as a text. [Course IV.]

Industrial Chemistry—Inorganic—Lecture—C-31. Preparation: C-22. During the second term of the third year lectures and recitations are held in industrial chemistry, the course in general following Riegel's "Industrial Chemistry," Third Edition. Particular attention is paid to the purification of industrial water supplies, the manufacture of heavy chemicals, such as acids, alkalies, bleach liquors, and mordants; the building industry, including the manufacture of Portland cement, glass, iron and steel.

The course is illustrated as far as possible with specimens, diagrams, and charts, and the students are given an opportunity to visit some of the industrial establishments in the vicinity of Lowell and Boston. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-32. Preparation: C-20, C-21. This is a continuation of the Textile Chemistry and Dyeing course of the second year, and includes a review of the second year's work in this subject, with the introduction of many advanced considerations, and in addition, the following subjects:—

COLOR MATCHING AND COLOR COMBINING.—A study of that portion of physics which deals with color and the many color phenomena of interest to the textile colorist. The lecture work is supplemented with the practical application of the spectroscope and tintometer, and much practice in the matching of dyed samples of textile material.

The primary colors both of the scientist and textile colorist, the results of combining coloring lights and pigments, and such subjects as color perception, color contrast, purity of color, luminosity, hue, color blindness, dichroism, fluorescence and the effect of different kinds upon dyed fabrics, are discussed under this heading.

Each student's eyes are tested for color blindness early in the course, in order that he may be given an opportunity to change his course if his eyes should prove defective enough to interfere with his work as a textile colorist.

A dark room has been provided where various experiments in color work and color matching may be performed.

DYE TESTING.—This subject includes the testing of several dyestuffs of each class, subjecting them to the common, color-destroying agencies; the determining of their characteristic properties, and their action towards the different fibers; also the determining of the actual money value and coloring power of dyestuffs in terms of a known standard.

Each student is required to make a record of each color tested upon an especially prepared card, which furnishes a permanent record of all dyestuffs, their dyeing properties, fastness to light and weather, washing, soaping, fulling, perspiration, bleaching, steaming, ironing, rubbing, acids and alkalies.

UNION DYEING.—A study of the principles involved in the dyeing of cotton and wool, cotton and silk, and silk and wool union materials in the production of solid and two-color effects.

TEXTILE PRINTING.—A thorough study of the whole subject of textile printing, each student being required to produce individually no less than twenty different prints, including the following styles; pigment style, direct printing style, steam style with tannin mordant, steam style with metallic mordant, madder or dyed style, the ingrain or developed azo style, discharge dye style, discharge mordanted style, resist style, indigo printing, aniline black printing.

The different parts of the calico printing machine are thoroughly studied; also the precautions which must be considered in its use, and the arrangement of the dyeing apparatus which must accompany such a machine.

Special attention is paid to the methods of mixing and preparing the various color printing pastes that are used in the above work upon a manufacturing scale as well as experimentally in the laboratory.

COTTON FINISHING.—A study of the various processes of finishing cotton cloth and the different materials used therein. The work involves the discussion of the various objects of cotton finishing and such operations as pasting, damping, calendaring, stretching, stiffening, mercerizing, beetling and filling, and the various machines used for carrying out these processes.

DYE HOUSE AND FINISHING PLANT MANAGEMENT.—A study of the organization and management of the modern bleacheries, dyehouses and finishing plants.

MILL VISITS.—During the third and fourth years visits are made to some of the large dyehouses, bleacheries and print works in the vicinity. [Course IV.]

Physical Chemistry—C-33. Preparation: B-10, C-10, C-13. During the third year, three hours per week of lectures and recitations are given on the application of the experimental methods and calculations of physics to chemical phenomena. Students passing this course may supplement it by the optional laboratory course C-42 in the fourth year. [Course IV.]

Organic Chemistry—C-34. Preparation: C-22. This course (one semester) is a continuation of Organic Chemistry C-22 extending over the alicyclic and heterocyclic series. The lectures also touch upon certain special topics such as general synthetical methods, theoretical considerations, natural products (vitamins, hormones, chlorophyll, the blood pigments, alkaloids), dyestuffs, etc. Book: Panagiotakos—Organic Chemistry. [Course IV.]

Technical German—C-35. Preparation: C-20, C-22, E-21. This course consists of the reading of German technical literature with the object of familiarizing the student with the current German publications in textile chemistry and coloring. [Course IV.]

Technical German—C-40. Preparation: C-35. This is a continuation of Technical German C-35. [Course IV.]

Organic Chemistry Laboratory—C-41. Preparation: C-20, C-22, C-23. A number of typical organic compounds are synthesized by general methods. A special problem is also assigned to train the student in longer or more difficult syntheses. Laboratory Book: Gatterman-Wieland—Laboratory Methods of Organic Chemistry. The second semester is devoted to the qualitative identification of organic compounds. Laboratory book: Mulliken-Huntress—Identification of Organic Compounds. [Course IV.]

Industrial Chemistry—Organic—C-42. Preparation: C-31. The chemistry and technology of the important organic industries, *i.e.*, rubber, petroleum, dyestuffs, drugs, explosives, oils, fats, soaps, waxes, plastics, fermentation products, etc., is considered, with special emphasis on rubber, petroleum and explosives in view of present war conditions. Synthetic methods and the research and development phases are stressed. [Course IV.]

Chemical Textile Testing—C-43. Preparation: C-21, C-32. A series of lecture and laboratory periods covering the theory and use of the instruments and methods used in testing and evaluating textile materials.

PHYSICAL TESTING.—Statistical methods, relative humidity, regain, staple, hair weight, fiber resiliency, counts and denier, twist, evenness, cloth count, weight, crimp, thickness, porosity, permeability, waterproofness, wetting out, absorbency, shrinkage, thermal insulating value, handle or draping quality, wear or abrasion, strength and stretch.

CHEMICAL TESTING.—Inorganic extraneous matter: ash, ash alkalinity, silk weighting, acids and alkalies. Organic extraneous matter: scouring loss, extraction, sizing and finishing materials. Fiber mixtures: qualitative analysis, quantitative analysis. Swelling and damage in cellulose fibers: qualitative tests, barium activity number, ash alkalinity, solubility in sodium hydroxide, Methylene Blue absorption, copper number, fluidity. Damage to wool: lead acetate test, thiocyanate test, Pauly test, methylene blue test, sulfur content, total nitrogen content, soluble nitrogen, ammonia nitrogen, solubility in dilute alkali. Damage to silk: Zimmermann test, total nitrogen, ammonia nitrogen, viscosity in zinc chloride.

OPTICAL TESTING.—Colorimeter, tintometer, pH apparatus, refractometer, spectroscope, spectrophotometer, ultra-violet, infra-red, luster. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-44. Preparation: C-32. This is a continuation of the third-year work in Advanced Textile Chemistry and Dyeing, and includes the following subjects:—

CLASSIFICATION AND MOLECULAR STRUCTURE OF ARTIFICIAL DYESTUFFS.—A study from a more advanced standpoint of the classification and constitution of artificial dyestuffs including the various methods used in their production, also the orientation of the various groups which are characteristic of these compounds and their effect on the tinctorial power of dyestuffs.

The object of this study is to give the student a more complete knowledge of the artificial dyestuffs from the color manufacturer's point of view, which will prove of particular value to those who intend later to enter the employ of dyestuff manufacturers or dealers.

ECONOMICS OF THE DYEING, BLEACHING AND FINISHING INDUSTRIES.—A study of the factors to be considered in the establishment of a dyeing, bleaching and finishing plant together with the most essential considerations of its management.

ADVANCED DYEING CONFERENCE.—During the latter part of his course each student will be required to write, for presentation before the other members of his class, a paper upon some assigned subject of general interest. After presentation the subject will be open to discussion and question.

The object of this conference is twofold. First, to give the student experience and practice in systematically looking up an assigned subject and presenting it before others; and secondly, to bring before the class a greater variety of subjects with more detail than could be covered by the general lectures of the course. [Course IV.]

Microscopy and Photomicroscopy—C-45. Preparation: B-23, C-20, C-22. A course of lectures and laboratory experiments on the use and construction of various types of microscopes and accessories, followed by the preparation of longitudinal and cross-sectional mounts of the various fibers. After a study of the different starches, fibers, and fabrics, a series of unknowns are examined and reported upon.

The lectures also include the subject of photomicroscopy. The laboratory course may be selected by the student as an optional course. [Course IV.]

Quantitative Analysis—C-46. Preparation: C-30. This course consists of lectures, recitations and quizzes on fuels and on the fundamental principles of analytical chemistry. [Course IV.]

Report Writing—C-47. Preparation: B-20a, E-20. The primary purpose of this course is to enable the student to write a technical report clearly and precisely; to this end it is necessary to present the data efficiently and with due regard to its accuracy. The meaning and determination of significant figures, the applications of statistical analysis, and the preparation and use of graphs are first studied. Suggestions on experimental work and the interpretation of results are then given. Formal and informal, technical and non-technical, laboratory, plant, and consultants' reports are discussed, and practice is given in their preparation. Instruction is also given on the use of the technical literature and the preparation of bibliographies. [Course IV.]

Textile Literature—C-48. Preparation: C-47. The object of this course is to introduce the student to the classical and current sources of information on textile chemical subjects. Each student is given certain references or subjects to report upon, which are sufficiently varied in origin as to make him familiar with the principal reference works and journals of textile chemistry. [Course IV.]

Advanced General Chemistry—C-49. Preparation: C-10, C-12, C-24, C-34, C-42, C-46. The object of this course is more to correlate the various branches of chemistry studied in the previous three and one-half years than to introduce new material. An attempt is made to show the essential oneness of all chemical knowledge. Recent theories are discussed briefly. [Course IV.]

Colloid Chemistry—C-50. Preparation: C-33. A lecture course on general colloid chemistry followed by its applications to textiles.

GENERAL.—Adsorption, surface tension and wetting-out, preparation and precipitation of suspensoidal sols, electrophoresis, emulsions, preparation and precipitation of emulsoidal sols, properties of irreversible emulsoids, protective colloids and detergents, gels, amorphous solids, use of X-rays, properties of proteins.

TEXTILE APPLICATIONS.—Cellulose, swollen cellulose, hydrocellulose, oxycellulose, ligno-cellulose, paper, cellulose esters and lacquers, rayons, silk, wool, silk weighting, mordanting, dyeing, felting of wool. [Course IV.]

The Chemistry of Rayon, Its Manufacture, Bleaching, Dyeing and Finishing—C-51. Preparation: C-32. During the past five years the developments of the bleaching, dyeing and finishing of rayon and other manufactured organic fibers, sometimes referred to as synthetic fibers, have been systematically studied and the curriculum of the Chemistry and Textile Coloring course has been revised from time to time to cover the latest developments in regard to these fibers. A complete unit for the actual manufacture of rayon is available for experimental and demonstration purposes, and the course includes laboratory practice in the manufacture of viscose rayon.

Many of the difficulties which arose during the early days of the so-called artificial silk industry were due to lack of knowledge of its properties and more or less persistent attempts to handle it in just the same manner as real silk. As soon as the textile manufacturer began to fully appreciate the fact that the various rayons were entirely different fibers from true silk and consequently must be handled by different methods, then many extensive improvements were made in the processes of manufacturing textiles containing these fibers. In order to satisfactorily handle the different rayons they must receive a preliminary treatment with various oils and softeners, and as a result the problem of establishing the specifications for the best type of oil to use for this purpose and also the best methods of removing it from the material during the finishing process have been important problems in the development of the industry, and these among others are being studied in the Lowell Textile Institute at the present time. [Course IV.]

Elective Subjects or Thesis during fourth year—C-52. Preparation: Satisfactory completion of all first and second year subjects in Course IV. The value of undergraduate thesis work for all students has frequently been questioned. There is no doubt that many senior students might take elective work of an advanced nature to greater advantage than devoting the same amount of time to specific thesis work. With this in mind several electives have been introduced, each elective period being 45 hours per term and four of these being required during the year.

Thesis. If a student has indicated through the first three years of his work that he is capable of handling an original investigation, a definite thesis subject may be assigned to him which will require the entire 180 hours. At the discretion of the Head of the Department, thesis subjects involving one or more elective periods may also be assigned.

In all cases, however, 180 hours' work of an advanced nature, either of thesis work or elective subjects, will be required for graduation.

Photography. A laboratory course in scientific or record photography, including developing, printing, enlarging, preparation of lantern slides, photography of apparatus and procedures, copying, and use of color filters. This course must be taken in preparation for Photomicroscopy.

Photomicroscopy Laboratory. A series of laboratory experiments followed by a research problem in photomicroscopy. The optical system, exposure, and use of color filters is studied and work is done on both fibers and fabrics. Students taking this elective should have had Photography or the equivalent in experience.

Advanced Microscopy. A laboratory course along one or more of the following lines:—

Quantitative microscopy: deconvolution count, classification and grading of wools, quantitative analysis of fiber mixtures.

Polarized light: production, optical effects, uses.

Cross-sectioning: advanced work on methods and refinements in technique.

Colloid Chemistry Laboratory. Experiments illustrating and amplifying the lecture course are performed. These may be on adsorption, hysteresis, surface tension, wetting-out, dialysis, viscosity, protective colloids, emulsification, detergency, gels, swelling, iso-electric point, dyeing.

Textile Chemistry Laboratory. A laboratory course on some branch of textile chemistry of particular interest to the student. This course is usually in the form of directed research.

Microbiology I. This course gives a general survey of the effect of the various micro-organisms on textile materials. Consideration is given to the methods of studying molds and bacteria and the methods of preventing their growth on textiles. In the laboratory the isolation, identification and properties of the organisms are studied. The detection of micro-organisms on fibers and damage to fibers caused by their growth is studied in detail. Methods of testing antiseptics to be used on textiles are also studied.

Microbiology II. A continuation of Microbiology I, laying special emphasis on the branch of microbiology in which the student is most interested. No lectures are given but each student is required to do certain reading and frequent conferences are held with the instructor. In the laboratory each student selects some problem and works it out as thoroughly as time permits.

Rayon. Advanced study of rayon dyeing.

Physical Chemistry. Measurement of molecular weights, heats of reaction, vapor pressure, surface tension, hydrogen ion concentration, electrical conductivity, etc.

Advanced Preparative Chemistry. The student is required to carry through certain preparations starting with a weighed minimum and handing in a weighed product. The preparations are so chosen as to review the principles of inorganic chemistry and at the same time develop the student's laboratory technique. By basing the grade on quantity as well as quality of product obtained, careful technique is encouraged. Conferences and quizzes are given before and after each preparation. The student is constantly required to apply the principles of previous lecture courses in analytical, inorganic and physical chemistry.

Textile—Chemical Engineering—Preparation: B-11, B-12, B-13, B-23, C-20, C-24, C-42. A combination of lectures and laboratory work designed for the study of the thermal properties of fluids, laws of thermo-dynamics as applied to batch and flow processes, flow of heat, mechanical mixtures, and heat engines.

This course will include such practical applications to the dyeing, printing, and finishing branches of the textile industry as efficient use of steam in heating dye

kettles—steam traps—measuring of steam used—calculating steam costs—study of best methods of piping steam for manufacturing purposes and economics of hot water storage.

Compression and fluid handling, testing of pumps, fans and similar chemical engineering equipment including some calibration of instruments will serve to give the student a general over-view of elementary chemical engineering.

Glass Blowing. A course in the elements of laboratory glass blowing, designed to give the man going into laboratory work a familiarity with the methods of handling both soda glass and Pyrex. All the ordinary seals and joints used in construction of apparatus are described and tried out in the laboratory.

Leather Chemistry. This course deals with the chemistry and technology of leather manufacture as well as with the fundamental chemistry of proteins and enzymatic action. It includes the consideration of high molecular weight compounds, the chemistry of fats and proteins, the action of the leather industry including tanning operations, and various applications of analytical chemistry.

Color Matching. A further study of the principles involved in color matching accompanied by actual matching in the dyeing laboratory of many dyed samples of a variety of colors.

Explosives and Chemical Warfare. The history, chemistry, physiological action and military use of the war poisons and of explosives is taken up. The course also treats of the protective measures against chemicals and the tactical use of the weapons.

Advanced Organic Chemistry. This course deals with theoretical organic chemistry and the biochemical aspects of the science such as the isolation, proof of structure and synthesis of physiologically important compounds and the chemistry of synthetic compounds of biochemical interest.

TEXTILE DESIGN AND WEAVING DEPARTMENT—D

Textile Design and Cloth Analysis—D-10. During the first year instruction is given in the subject of classification of fabrics, use of point or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks, stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

This subject takes up in a systematic manner the analysis of samples illustrating the various cloth constructions for the purpose of determining the design of the weave and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric. [First term, all courses.] [Second term, Courses I, II, III, VI.]

Textile Design and Cloth Construction—D-20. For Cotton Goods—Preparation: D-10. During the second year consideration is given to fancy and reverse twills, diaper work, damasks, skip weaves, sateen fabrics with plain ground, backed fabrics, and multiple ply fabrics. Students are required to make original designs and put the same into the loom. Special attention is given to the consideration of color effect.

During the first term free-hand drawing is taught by means of plates, and practice in coloring is given in conjunction with this work.

Practice in lettering, spacing and general arrangement of designs and sketches is given. The engineering alphabet is used in all work.

During the second term instruction is given in drawing, sketching, coloring and designing, with reference to their application in textiles. Good examples of applied design in textiles, as well as in other branches, are used as a basis for modified designs selected and composed by the student. This stimulates originality as well as teaches the student to appreciate good designs and color.

The analysis of these fabrics forms a part of the course in design. This also

includes the necessary calculations required to reproduce the fabric or to construct fabrics of similar character. [Courses I, III, VI, Options C, D, S.]

Textile Design and Cloth Construction—D-21. For Woolen and Worsted Goods—Preparation: D-10. During the second year the instruction given includes warp and filling backed cloth, figured effects produced by extra warp and filling, double cloths, multiple ply fabrics, cotton warps, blankets, bathrobes, crepes, filling reversible, Bedford cords, imitation furs, crepons, matelasse and imitations, double plain, ingrains, velvets, corduroys, overcoatings, trouserings.

The analysis of these fabrics, together with the consideration of the shrinkages and dead loss in all fabrics, theory of diameter of yarns, and costs of blends and mixes is a part of this course. [Courses II, III, VI, W, D, S.]

Textile Design and Cloth Construction—D-22. Preparation: D-10. This is a short course covering the elementary principles of designing in general. Instruction is given in the theory of shrinkages and the lay-out of woolen and worsted fabrics, and at the same time similar instruction is given in the design and construction of cotton fabrics. [Course VI, General Option.]

Jacquard Design—D-23. Preparation: D-10. This course, given during the second term, covers detail instruction of the Jacquard machine and the various tie-ups in common use, the layout for different kinds of fabrics, and the cutting of cards in accordance with prepared designs. The adaptation of various designs to woven fabrics through the aid of cross section paper and its correlation with the different types of looms and Jacquard machines are thoroughly covered. The student is encouraged in original designs and such of these as meet approval are carried out in woven goods. [Course III.]

Power Weaving—D-24. Preparation: D-10. In connection with the work in Textile Design and Cloth Analysis practical work is carried on upon the power looms. This includes the preparation of warps, beaming, dressing, sizing, drawing-in and making of chains, spooling and quilling, and the machinery for the same. A study is made of warpers and sizing machines for cotton, woolen, silk and rayon. Lectures are given to correspond with the progress of the student in the Power Weaving Laboratory covering the following subjects: loom adjustments, chain building, cam looms, automatic shuttle changing looms, dobby looms, single and double acting dobbies, Knowles looms, leno weaving, center selvedge motion, automatic filling changing looms, towel and other pile cloth weaving, Jacquard looms, single and double lift leno Jacquards, Jacquards of special design, the cutting and lacing of cards, and tying up Jacquard harness. The Baker automatic attachment for mixing the filling is also considered. [Courses I, II, III, VI.]

Power Weaving—D-24a. Preparation: D-10. This is a lecture course given during the first term and covers briefly the fundamentals of weaving, types of looms suitable for weaving different fabrics, warp preparation, especially slashing machinery and compounds for rayon, cotton, woolen and worsted yarns. [Course IV.]

Textile Design and Cloth Construction—D-30. Preparation: D-20 or D-21. The advanced work takes up the more complicated weaves adapted to harness work, and leads into leno and Jacquard designs. The following is a brief list of the subject heads, which will give some idea of the course: double plain cloths, ingrains, tricot, chinchilla, tapestry, blankets, upholsteries, spot weaves, pile or plush, crepon, matelasse and its imitations, pique, Marseilles, quilting, and miscellaneous designs for Jacquard, leno, fustian, tissue fabrics and lappets.

Original designs and sketches for particular grades of goods and the study of color effects form an important part of the third-year course. It should be understood that work in decorative art is carried on in conjunction with textile construction and weaving, particularly on the Jacquard loom. Designs of merit are carefully developed in detail and woven into cloth.

The work in cloth construction includes the application of the different weaves and their combinations in the productions of fancy designs, both modified and original; the calculation involved in the reproduction of standard fabrics changed to meet varying conditions of weight, stock, counts of yarn and value; and the discussion of the breaking strength of fabrics and relationship of the construction of the fabric to breaking strength.

Instruction in this subject, which is given by classroom work, is intended to bring together the principles considered under the subject of design, cloth construction, weaving and yarn making of previous years, and to show the bearing each has in the successful construction of a fabric. [Courses III, VI, Options D, S.]

Power Weaving—D-32. Preparation: D-20, D-21, or D-23. Instruction is given in weaving on fancy woolen and worsted looms, single and double acting bobbies, leno weaving, double and single lift Jacquard looms, tying up Jacquard harness, leno Jacquard, harness and box chain building; warp preparation for woolen, worsted, cotton, silk and rayon; formulas for making up different kinds of sizing. Lectures are given to correspond with the same. Automatic shuttle changing looms and automatic filling changing looms are taken up as well as the Baker attachment for mixing filling. [Courses I, II, III, VI.]

Color—D-33. A study of color wheels, values and chromas, combinations and proportions as well as color to produce a pleasing effect for the design in question. [Courses I, II, III and VI, Options D, S.]

Principles of Design—D-34. This is in preparation for the Jacquard course. Through the principles of decorative design an understanding is acquired for the proper balance, distribution and repetition of motifs suitable for both the woven or the printed pattern. [Courses III, VI, Options D, S.]

Jacquard Design and Weaving—D-40. Preparation: D-23. Instruction bears particular stress on the sketching of original designs as applied to particular fabrics with reference to the more advanced forms of fabrics and warp tie-ups. In this work the student not only produces his own sketches but must carry his ideas through to the finished fabric. [Course VI, Options D, S.]

Textile Design and Cloth Construction—D-41. Preparation: D-10, D-20, D-21. The work in this course is the application of the instruction received during the three years previous. Particular attention is given to the layout of designers' blankets. Instruction in the production of new designs is given by the use of design suggestion sheets. As in the Jacquard work the student must not only lay out the blankets but must put them in the loom and work out the various effects for himself. [Course VI, Options D, S.]

LANGUAGE AND HISTORY DEPARTMENT—E

English—E-10. Preparation: Admission Requirements. A technically trained man should be able to express himself clearly, forcibly and fluently, as inability to do so will be a serious handicap to him in after life. The object of the English course is to develop the student's power of expression by a thorough study of the principles of advanced rhetoric and composition, and by constant writing of themes illustrative of the four forms of discourse, viz., description, narration, exposition and argumentation. In addition to the study of rhetoric and composition and the writing of themes, several classics such as are not read in the preparatory schools are studied and discussed. [All courses.]

Elementary German—E-11. Preparation: Admission Requirements. This course is intended for first-year students who do not offer German as an entrance requirement and who desire to take the course in Chemistry and Textile Coloring. It may be selected by students taking the Textile Engineering course who have not fully met the entrance requirements in language. The work is elementary in character, and much time is devoted to the study of the rudiments of German grammar with practice in composition. During the latter part of the year considerable attention is given to the reading of ordinary German prose, which serves as an additional preparation to the student for the later reading of works along scientific and industrial lines. [Course IV.]

English—E-20. Preparation: E-10. The curriculum of this course is based upon the sound belief that the young man about to enter business can profit much by the study of the principles and the rules of standard English as applied to business writing. The student is given a comprehensive remedial review of the fundamentals of grammar in their relation to practical expression in writing letters and reports. Class discussions of actual quoted letters, collateral readings, and home

preparation of written assignments afford the student abundant opportunity to enlarge his vocabulary and to improve his style. During the second semester, modern essays and other works of fiction are read and discussed. The course meets twice each week. [Course IV.]

Advanced German—E-21. Preparation: E-11. For students taking the course in Chemistry and Textile Coloring the elementary course of the first year is continued throughout the second year. The work consists of the study of some of the more advanced principles of grammar, and especially of the reading of scientific German, dealing with a variety of subjects, and the translation of commercial German. [Course IV.]

Economics—E-30. Preparation: E-10. This course, meeting three times a week, is conducted by means of lectures, discussions, and recitations, supplemented by textbook reading and study of charts analyzing various phases of industrial problems. The character of the course is descriptive and practical rather than theoretical, and the aim is to acquaint the student with the accepted principles of economics and some of their applications to industrial conditions.

The course will also deal briefly with economic history, showing how the present economic system has evolved from past systems and pointing out how the experience of the past can aid in the solution of present problems.

Besides the historical material, other topics discussed are the nature and scope of economics; the evolution of economic society; the three factors of production, land, labor and capital; the four elements in distribution, rent, wages, interest and profits; business organization; value and price; monopoly; money, credit and banking; international trade; protection and free trade; transportation; insurance; economic activities of municipalities; and public finance. In short, it is an outline course dealing with the fundamental principles that underlie a wide range of activities. [Courses IV, VI.]

Seminar in Business English—E-40. Preparation: E-10. This course is a conference course for those who wish to pursue intensive advanced study in the field of business English. Second semester, one hour each week. [Course IV.]

COTTON YARNS AND KNITTING DEPARTMENT—F

Cotton Carding—F-20. Preparation: B-10, B-12, B-13. This course is given in the first term of the second year and includes instruction regarding the growth, classing and handling of raw cotton and the processes of opening, picking and carding. Considerable time is spent studying cotton production and characteristics so that the student may have a real appreciation of some of the processing problems originating in the cotton itself. The basis of cotton classing is thoroughly covered here and the general background of how cotton is bought and sold is explained.

The mill processes of opening, picking and carding, and the many different types of machines in use are thoroughly studied. Special textbooks with many illustrations have been prepared so that the student may devote his entire attention to class discussions. The calculations pertaining to the various operations are covered in detail. The various settings possible and their effect on quality or production are made clear also.

The laboratory work for this course includes classing practice, fiber study and comparison, waste tests and comparisons, and studies of machine constructions and gearings. [Course I.]

Cotton Carding—F-20a-b-c. Preparation: B-10, B-12, B-13. These courses include the same lectures as course F-20 but the time devoted to laboratory work is reduced progressively in the order given. [F-20a Course VI, Option C; F-20b Courses III, VI, Options G, S; F-20c Course VI, Option D.]

Cotton Carding—F-21. Preparation: F-20. This course, given in the second term of the second year, is a continuation of the work of the first term and includes work on carding, combing, drawing and roving. Here again, special textbooks have been prepared with many illustrations, showing machine cross-sections and details of different actions and parts. While the main part of the work is to clearly explain the purposes and principles of each machine, all the various calculations and set-

tings pertaining to each are carefully studied and problems are assigned for student practice.

The laboratory work required in connection with this course includes a series of specific experiments illustrating various phases of the work of each operation. Other laboratory work consists in processing various lots of cotton in preparation for spinning. [Course I.]

Cotton Carding—F-21a-b-c. Preparation: F-20a-b-c respectively. These courses include the same lectures as Course F-21 but the time devoted to laboratory work is reduced progressively in the order given. [F-21a Course VI, Option C; F-21b Courses III, VI, Option G; F-21c Course VI, Options D, S.]

Cottons F-22. Preparation: F-20 taken simultaneously. This course consists of lectures and laboratory work, supplementary to Course F-20, for those students who study cotton only. Some time is spent on the details of cotton fiber growth and structure and in comparing cotton with other fibers. The economic importance of cotton is studied and sources of information regarding cotton and its processing are given to the class. [Courses I, VI, Option C.]

Cotton Waste Processing—F-23. Preparation: F-20, F-21. For those specializing in Cotton Manufacture, this course provides a survey of the methods and machinery used in processing cotton wastes, or new cotton handled on waste machinery. The lectures consider the sources of the various wastes, their preparatory treatment and the manufacturing processes. Samples of wastes and products are used to demonstrate the possibilities in this field.

The laboratory work of Courses F-20 and F-21 provide practice with some wastes and their processing. [Courses I, VI, Option C.]

Cotton Spinning—F-30. Preparation: F-21. This course is a continuation of the study of yarn manufacture and covers the many types of regular and long draft spinning. Such details as spindles, rings, travelers and builders are carefully explained and such factors as twist, contraction and strength of yarns are thoroughly studied. Particular consideration is given to the production of yarns for different uses and how desired characteristics may be obtained. All the calculations regarding yarns and spinning frames are thoroughly studied and problems are assigned for student practice.

The laboratory work for this course includes a series of specific experiments and tests illustrating important phases of the operations and practice in spinning various counts from roving which the students have made previously. [Course I.]

Cotton Spinning—F-30a-b. Preparation: F-21a and F-21b-c respectively. These courses include the same lectures as Course F-30 but the time devoted to laboratory practice is shortened in different degrees. [F-30a Course VI, Option C; F-30b Courses III, VI, Option G, D, S.]

Cotton Winding and Twisting—F-31. Preparation: F-30. This course is a continuation of the course on spinning, in which the instruction includes the conclusion of spinning, spooling and the various types of winding, twisting of common and fancy yarns and such incidental features as reeling, baling, mule spinning and rope manufacture. (Some of these items are optional.) All the calculations regarding winders and twistors are thoroughly studied and problems are assigned for student practice.

The laboratory work includes specific studies, experiments and yarn analyses. Other work required involves the winding of yarns under various conditions and the production of plied yarns to meet specified construction. [Course I.]

Cotton Winding and Twisting—F-31a-b. Preparation: F-30a-b respectively. These courses include the same lectures as Course F-31 but the time devoted to laboratory practice is shortened in different degrees. [F-31a Course VI, Option C; F-31b Courses III, VI, Option G, D, S.]

Cotton Quality Control—F-32. Preparation: F-21, F-30, or F-21a, F-30a. While it is customary to point out defects in the materials during the processing in all the laboratory work, this course provides a logical summary of the usual defects which appear in different stages of cotton manufacture. The student is taught to recognize defective work and is given the usual causes of the common defects. The usual procedures and methods necessary to avoid or correct the defects are ex-

plained. Many samples of defects are used to illustrate this course. Every effort is made to develop the student's diagnostic ability so that he may readily recognize and remedy new defects as he meets them. [Courses I, VI, Option C.]

Staple Fiber Manufacture—F-33. Preparation: F-21, F-30, or F-21a, F-30a. Using the preparatory courses as a background, this course offers a study of the methods of manufacture of various staple fibers, such as wool, rayon or the new synthetics, on regular or modified cotton machinery. As this is a rapidly changing field, the course is planned to take advantage of the new developments as they appear. Considerable of the work in this course is of the discussion type, which aims to correlate all the work on yarn manufacture and bring it to bear on the processing of staple fibers. [Courses I, VI, Option C.]

Cotton Organization—F-34. Preparation: F-21, F-31a or b. This course correlates all the work on Cotton Manufacturing. Starting with a study of actual mill organizations the class is carried forward to problems in developing new organizations for specific types of products. The adaptations for long draft and the handling of staple fibers are carefully covered. The machinery necessary to keep plants in balance is calculated, with some consideration of the best arrangements for economical handling. Some time is given to the use of efficiency work and end breakage studies for cotton mills. [Courses I, VI, Options G and C.]

Thesis—F-35. Preparation: F-21, F-30. Each student is required to present a thesis which is a report of some original work. In some cases this is the production of some yarn or fabric to meet certain requirements. In other cases, the thesis is a study of some technical problem regarding the effect of certain changes in manufacturing conditions. [Course I.]

Knitting—FK-20. Preparation: B-12, D-10. This course, which is given in the second term of the second year for certain options of the engineering course, covers the first half of the lectures and laboratory work given in Course FK-30. [Course VI, Options D, G.]

Knitting—FK-30. Preparation: B-12, D-10. This course is a broad survey of the important types of knitting. Considerable stress is placed on the various stitches and the characteristics of fabrics from each. Starting with flat machines, the work advances through small ribbers, automatic hosiery machines, full fashioned hosiery machines, underwear machines and warp knitters. The analysis of knit fabrics and the classifications and routines for manufacture of hosiery and underwear are included.

The laboratory work consists of a series of carefully organized experiments in which the students operate standard machines to produce some knitted article or fabric. Auxiliary equipment for transferring, looping and sewing is available if needed. Fabric and hosiery analysis are included in this work. [Courses I, II, VI, Options C, W.]

Knitting—FK-30a. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but does not include any laboratory work. [Course VI, Option G.]

Knitting—FK-30b. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but has only one-half the laboratory time. [Course VI, Option S.]

Knitting—FK-31. Preparation: FK-21. Given in the first term of the third year, this is a continuation of Course FK-21 and completes the work given as lectures and laboratory in Course FK-30. [Course VI, Options D, G.]

Knitting—FK-40. Preparation: FK-31. This is an advanced course for students who are specializing in knitting. With the approval of the department, the student may select a particular field from the various sections of the knitting industry and concentrate on its problems. [Course VI, Option G.]

WOOL DEPARTMENT—G

Fiber Preparation—G-20. Preparation: B-10, B-12, B-13. RAW MATERIALS.—A study of raw materials which enter into the manufacture of woolen or worsted yarns, or which are made into yarns by processes similar to those em-

ployed in the manufacture of woollen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel's hair, cotton, flax, hemp, jute, ramie and cut staple.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lecture and by actual sorting of fleece wool under the direction of an experienced wool sorter. The various characteristics and properties are explained, as are also trade names, such as picklock, XXX, XX, $\frac{1}{2}$ -blood, $\frac{3}{8}$ -blood, $\frac{1}{4}$ -blood, delaine, braid, etc. Some skill is acquired in the estimation of shrinkage and in judging the spinning qualities.

WOOL SCOURING.—The object of scouring and the methods employed are explained, and this involves the consideration of the soaps and chemicals used in scouring; also the waste products and their utilization. Actual work is done in scouring a commercial quantity of wool by machines that are made similar in operation to regular commercial machines. At the same time the use of dryers, their operation and regulation is taken up.

CARBONIZING.—The various methods of stock carbonizing are explained in detail in the lecture course. Actual carbonizing of noil, burr waste, and defective wool is carried out by the sulphuric acid method on commercial size machines in the laboratory.

TOP MAKING AND COMBING.—This branch takes up in all detail the carding of wool on a worsted card, the preparing processes, back-washing and Vigoureaux printing, also gilling of the stock before and after combing. The construction of the gill boxes and combs is studied by lectures and by dismantling and assembling these machines in the laboratories. Later, quantities of stock are made into top and then into yarn.

The Noble comb is studied, and the various calculations to determine draft, noiling, tear, productions, etc., are made. [Courses II, III, VI, Options G, W, D, S.]

Woolen Yarn and Reworked Fiber Manufacture—G-21. Preparation: B-10, B-12, B-13. REWORKED FIBER.—Rags of all kinds are studied, sorted, and all processes necessary to convert them into fiber are covered in detail.

WOOL BLENDING, OILING AND PICKING.—Mixing and shading of colors and qualities of wool are studied and practiced. The details of Burr Pickers and mixing pickers including the Fearnought are studied in full. The importance of oils and emulsions is stressed in lecture and laboratory.

WOOLEN CARDING.—The system of carding wool for woollen yarn is fully explained, as is also the construction, setting and operation of the cards. A part of the work is the reclothing and grinding of the cylinders, strippers, workers, etc. The carding of suitable and commercial quantities of wool, and the further manufacture of it into yarn, serves to fix the principles of carding in the mind of the student, as well as to give him some skill in handling machinery.

WOOLEN SPINNING.—The computations necessary in converting roping into yarn are fully explained. The details of construction and operation of the spring and cam type mule are well covered in lectures and practice. The theory and practice of continuous or ring spinning for woollen is also taken up. The conditioning of yarn after spinning by steaming is explained.

Costs and details of a yarn mill are mentioned in brief as well as some causes of poor yarn and its effect on mill production. [Courses II, III, VI, Options G, W, D, S.]

Worsted Yarn Manufacture—G-30. Preparation: G-20. INTERSECTING GILL BOXES AND FRENCH COMB.—The equipment of the laboratory offers opportunity for the production of dry-combed top and its comparison with oil-combed top produced on the Noble comb. The structures and uses of intersecting gill boxes and the study of combing and drawing blends is taken up at this point.

DRAWING AND SPINNING.—The laboratory equipment consisting of the Bradford (English) system of drawing, of both open and cone types, as well as the various processes of French drawing, followed by both worsted mule and ring spinning frame, make possible a thorough study of the manufacture of worsted yarn by all of the existing methods.

The same method of study of mechanisms, calculations, and operations of the

various machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

ORGANIZATION.—At the end of the course the layout of a properly balanced yarn mill is studied, and at the same time the cost of machinery, depreciation, labor costs and machinery arrangements.

THESIS.—Before graduation the student must present visible evidence of his knowledge of woollen and worsted manufacture by the production of twenty yards of fabric from his own design (or reproduction or modification of some existing fabric) beginning with the raw material.

A formal typewritten description, including all calculations and observations, together with samples from each machine, must be presented to the head of the department before the final examination. [Courses II, III, VI, Options G, W, D, S.]

Technology of Wool Manufacture—Lectures and Demonstrations—G-40. Preparation: C-21, C-32, D-10. This course is planned to supplement the instruction already given in design, cloth construction, chemical technology of fibers, scouring, dyeing and finishing, with sufficient lectures and demonstrations in sorting, scouring, backwashing, gilling, combing, top-making, English drawing, spinning, twisting, warping, and weaving, to make the processing of grease wool and allied fibers into ordinary worsted spun yarn fabrics, clear as to object and continuity.

The manufacture of virgin and reworked wool into woollen spun fabrics, with scouring, carbonizing, mixing, picking, carding, spinning, twisting, warping and weaving is also given. Illustrated descriptions of the manufacture of hardened, woven and needle loom felts are taken up.

Mechanical details and calculations are subordinated to familiarizing the student with the nature and object of the several processes. [Course IV.]

FINISHING DEPARTMENT—H

Woollen and Worsted Finishing—H-30. Preparation: B-12, C-10, D-10, D-24. The outline of this course, which is given by means of lecture and laboratory work, is as follows:—

BURLING AND MENDING.—Under this head is taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are all considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the early types of stocks, hammer falling and crank stocks, and their modifications and development into the present type of rotary fulling mills of both the single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, methods of covering, regulation and means of adjusting the pressure of traps and rolls, consideration of the shoes, the use and regulation of the various types of stop motion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hydroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the reduction of various degrees of felt as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The

manipulation of the various kinds of goods in the mill, viz., all wool, shoddies and mixed goods, is studied in classroom and by operation in the mill.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods both before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and scours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions, and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING, STEAMING, SINGEING AND CRABBING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing, and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year. [Courses II, III, IV, VI, Options G, W, D, S.]

Cotton Finishing—H-31. Preparation: B-12, C-10, D-10, D-24. The outline of the course in the finishing of cotton fabrics is as follows:—

CLOTH ROOM.—Instruction of the various goods and the object thereof; construction of the various types of inspecting and trimming machines.

SHEARING.—The object. A consideration of the various types of shears for treating one or both sides at the same time; also the use of the usual cleaning devices, such as emery, sand and card rolls, beaters and brushes; grinding and the adjustment of the various parts.

The use of brushing and cleaning machines, rolling devices and calender attachments for gray goods.

SINGEING.—Developing and object of singeing; the construction of singers of all types and for various purposes; the use of cooling tanks; steaming devices, rolling and brushing attachments.

Regulation of the flame for various goods, and adjustment of the parts; gas and air pressure, water-cooled rolls; the effect of moisture on the cost of singeing and use of dry cans in connection with singeing; electric singeing.

WASHING.—Open width and string washers, their construction and operation; soaps, temperature, squeeze rolls; washing of various goods and the object thereof; stains.

NAPPING.—The object of napping and the usual method of treating goods; various types of nappers, single and double acting; felting nappers; construction, grinding and adjustments of various types.

WATER MANGLES.—Their objects and the construction of various types; various rolls, iron, husk, etc.; scutchers, their object and constructions.

STARCH MANGLES.—The object and construction of all types of starch mangles for pure starch and filled goods; various types of rolls, brass, rubber, wood; action of doctor blades, etc.; regulation and object of pressure.

Methods of starching and finishing all standard goods, also a consideration of the various substances used, such as starch, softener and fillers; the preparation of starch and various methods of application.

DRYERS AND STRETCHERS.—Both horizontal and vertical types of drying cans, tenter frames, clips, etc.; the swing motion and the finishes thus produced; object and construction of spraying machines, belt stretchers, short tenters, button breakers, etc.

CALENDERS.—The object and construction of all types, including the regulation of pressure and nips for the production of various finishes; various types of rolls and their uses,—steel, husk, cotton, paper, etc., the use of hot and cold rolls; chasing, friction, embossing and Schreiner calenders, and the various finishes produced by each; production of watered effects; beetling machines and hydraulic mangles.

Making-up room,—yarding, inspecting; different types of folds; pressing, papering, marking. [Courses I, III, VI, Options G, C, D, S.]

EQUIPMENT

The equipment of machinery, inventoried at \$458,000.00, is most varied for textile educational purposes, and is being constantly augmented. The builders of the various machines installed keep in close touch with the Institute, adding to the machines such improvements as are made from time to time. This operates to the mutual advantage of student and manufacturer.

Cotton Yarn Department.—The opening and picking section of this department contains a 50-saw Pratt gin used for experimental purposes. For classing work, there is a special section with north light, where Universal Standard Grades, Government Staple Standards, and many different commercial cottons, American and foreign, are available.

The picking equipment consists of a 40-inch Saco-Lowell three beater single process picker with a Blending Reserve.

The card section has three standard revolving flat top cards, one each from Saco-Lowell, Whiting, and Howard and Bullough shops.

The combing section consists of a sliver lapper, one four-head ribbon lapper, one two-head comb, and one eight-head comb, all from the Whiting Machine Works. There is also one two-head Nasmith comb from John Hetherington and Sons of England.

For drawing, there is a two delivery Howard and Bullough head equipped with metallic rolls and electric stop motion. From the Saco-Lowell Shops, there is a railway head and two four delivery heads, one of which is equipped with a Chapman Neutralizer.

The roving section has a complete equipment, slubber, intermediate, fine and jack frame from the Saco-Lowell Shops. In addition, there is an intermediate frame made by the Woonsocket Machine and Press Company, and a fine frame from Howard and Bullough.

The spinning equipment is quite varied both with respect to builders and with respect to types and sizes. The Saco-Lowell Shops have supplied five different frames varying from 36 to 216 spindles. They are suitable to spin counts from 3s to 80s. One is equipped with the Saco-Lowell Roth long-draft system. A sixth Saco-Lowell frame was supplied by the Acme Machine Company equipped with Chapman ball-bearing spindles. The Whiting Machine Works is represented by

three frames on which counts from 3s to over 100s can be spun. One of these frames has an auxiliary equipment of SKF roller-bearing spindles and is fitted on one side with Casablanca long-draft equipment. The Howard and Bullough shops have one spinning frame suitable for counts from average to fine. This is equipped with an English type of builder which distinguishes it from the other frames. There are two Fales and Jenks frames. One is equipped on one side with the Casablanca long-draft system, and the other is a 72 spindle frame equipped with the latest Whitin long draft system. An Asa Lees Company mule, suitable for counts above 30's, has been retained to illustrate this peculiar type of spinning.

There is one short spooler from the Saco-Lowell Shops. There are two winders from the Foster Machine Company, one for single ends either on cones or tubes, the other for one, two, or three ends parallel wound, especially for preparation for twisting. There is also a one gang Universal No. 50 winder with individual drive suitable for winding ordinary tubes or Franklin Process packages.

The twistors are suitable for all counts. There is one each from the Saco-Lowell, the Howard and Bullough, and the Fales and Jenks Shops. These are all equipped for either wet or dry twisting of average and fine counts. There are two twistors from the Draper Corporation. These are equipped for wet or dry twisting for coarse counts or heavy plies.

To prepare mill wastes for re-use there is one single cylinder roving waste opener and one thread extractor, both from the Saco-Lowell Shops.

The department has a complete coiler waste system as made by the Saco-Lowell Shops, consisting of a 40-inch single coiler side delivery breaker card; a 40-end derby doubler; a 40-inch four coiler finisher card; a combination slubber-intermediate and a waste spinning frame. The cards are both equipped with Chapman neutralizers intended to overcome any trouble originating from static electricity.

With the exception of the opening-picking room the humidity in this department is controlled automatically by a system installed by the American Moistening Company. Seven high duty heads supply the necessary moisture and air circulation. An adjustable automatic control regulates the humidity to the desired per cent.

The experimental laboratory is equipped with a power driven skein tester for determining yarn strength and a Moscrop single thread tester for single end strength. There are twist counters for determining the amount of twist and the twist contraction. For fine work and for fiber study, there is an analytical balance and a Spencer microscope equipped with three objectives, three oculars, ocular micrometer, mechanical stage and Abbé condenser.

Knitting Section.—The winders for this section include a six-spindle No. 50 cone winder, equipped with swifts for winding from skeins, suitable for fine cotton, worsted, silk and rayon yarns, a Payne bobbin winder suitable for coarse woolen, worsted and cotton yarns, and a Foster winder suitable to wind cones or tubes.

Under the group of flat machines there are three Lamb machines, one arranged for knitting gloves and one arranged for knitting sweaters. In addition to these there is also a Grosser sweater machine, a Jacquard machine, and a link and link machine; two Dubied scarf machines, and a Raschel warp knitter.

In the automatic hosiery machine section are included three Banner machines,—220 and 200 needle full hose machines and a 160 needle half hose machine; four Scott & Williams Machines,—a 200 needle B-5, a 220 needle Model K, a 220 needle HH and a 160 needle RI. This section also includes two Acme stationary cylinder machines and a Mayo model C full automatic. For fundamental instruction a Branson 80 needle hand machine is included. For hosiery legs and tops there are five ribbers, made by the Wildman Company, with cylinders varying from 3-5¼ and arranged for needles varying in number from 100-240; two Brinton ribbers, one arranged for 176 needles and the other 200 needles; one Brinton tie machine, 1¾-inch cylinder 100 needles and 49 needles; one Universal Ribber 3½-inch diameter, 160 needles. To illustrate the fully fashioned type of knitting hosiery there is an 18 section, 39 gauge Reading legger, with topping stand.

The underwear machinery consists of a Scott & Williams ribber, a Wildman ribber, a single head Crane spring needle machine and a two head Tompkins spring needle machine. Melting pots and molds are available for leading needles.

For finishing work this section includes a Grosser 2-thread looper, one Hepworth looper, two Beattie loopers, a Sotco 20-point looper with an individual table and motor drive; five Union Special sewing machines for overseaming, double stitch covering, seaming and welting and vest finishing; seven Merrow sewing machines, including one shell stitch machine and three overseaming and crocheting machines; three Singer machines; three Wilcox & Gibbs sewing machines, including a flat-lock machine.

The Philadelphia Metal Drying Form Company has installed a table of six forms including men's, women's and children's.

For instruction in the manufacture of braids the New England Butt Company has installed one 24-line Hercules braider, one 12-line braider, one tubular braider, and one soutache braider.

Wool Yarn Department. — The following machinery and equipment is available for use in the manufacture of yarn on the woolen principle.

Installed by Davis & Furber Machine Company: One wool mixing picker equipped with hooper feed (George S. Harwood & Son), one modern 60 x 40 three cylinder set of cards with Garnet Breast, single breaker and double finisher, each driven by Westinghouse variable speed motors through silent Whitney chains, improved Bramwell breaker feed by Harwood & Sons, Davis and Furber Broadband intermediate feed and 80 end four bank single apron tape condenser with all change gears and pulleys; one set 48 x 40 cards with single breaker, intermediate, and finisher cylinders, Bramwell breaker feed, latest type Apperly-Harwood transfer feeds with 40 end ring doffers and two apron condenser; one Model B woolen ring spinning frame, motor driven, with 60 spindles 2½-inch rings; one 120 spindle spring mule with bobbin holders by the American Bobbin Holder Company; one 20 spindle 2½-inch ring twister for novelty yarns.

Installed by C. G. Sargent's Sons Corporation: One multiplex burr picker for medium wools, one yarn conditioning machine with motor drive.

Installed by Johnson and Bassett, Inc.: One 120-spindle cam mule complete.

Installed by Torrance Manufacturing Company: One sample mixing card for blending and matching wool.

Installed by B. S. Roy & Son: One card grinding stand with two traverse grinders complete.

Reworked Fiber Division. — Installed by C. G. Sargent's Sons Corporation: One cypress screw acid dip tank; one single apron dryer (baker); one cone carbonizing duster with crush rolls.

Installed by Schaum & Uhlinger, one steam hydro-extractor.

Installed by C. S. Dodge of Lowell, one ball bearing rag picker with condenser, one bagging stand.

Installed by John T. Slack Corporation are many samples of reworked wool in all stages from rags to fiber.

Wool Preparing Division. — Wool sorting and grading is carried on under excellent conditions with the following equipment: sorting bench, baskets, bagging stands.

Installed by C. G. Sargent's Sons Corporation: One grease wool cone duster, one four bowl scouring train with large hopper feed; one single apron dryer with large feeder.

Many samples of all types of wool are available for study.

Top Making Division. — Top for the Bradford or French system is made with the following machinery: One double cylinder worsted card (four licker-in) with can coiler and balling head, complete, by Davis & Furber Machine Company, and with a Bramwell automatic feeder supplied by George S. Harwood & Sons. An electric neutralizer is furnished on card by the Chapman Electric Neutralizer Company. This section also includes a double bowl, 5-cylinder backwasher, with gill box, Taylor-Wordsworth & Co., equipped with blueing motion, oiling motion, and Layland patent pressure motion; a weigh gill box and creel and one doubling balling head gill box (with double screws) made by the Saco-Lowell Shops; two worsted combs with baller punch, one made by Crompton & Knowles, and the second made by James Smith & Sons; two finishing gill boxes, one known as a can gill box and the other a balling head gill box, both made by Hall & Stells.

Worsted Yarn Division.—Bradford or English System: For the manufacture of yarns under the Bradford System of Drawing, Spinning, and Twisting, the following machinery as made by Prince Smith & Son, make up the equipment: one revolving creel for 12 balls, one 2-spindle drawing box, one 4-spindle first finisher, one 12-spindle dandy reducer, one 12-spindle cap frame, one double head can gill box, one 2-spindle gill box, one 2-spindle flyer frame, one 12-spindle ring frame, one 12-spindle 2-fold cap twister, one 12-spindle 6-fold ring twister. One 36-spindle ring spinning frame with motor drive has been installed by Whitin Machine Works. In addition to this the Saco-Lowell Shops have installed the following machinery to carry on similar work: one 2-spindle drawing box, one 6-spindle second finisher, one 24-spindle dandy rover, one 6-spindle cone reducer, one 8-spindle cone rover, one 48-spindle cap spinner, 5-foot end, one 48-spindle cap spinner, 4-foot end, one 48-spindle Boy ring twister. The Universal Winding Company has installed one of its 6-gang winders, equipped for cones or straight tubes. The Lindsay-Hyde Company has installed a modern skein winder.

The humidity in the laboratory as well as in the testing laboratory of the woolen yarns and of the English system of worsted yarns is maintained by the American Moistening Company's system of six humidifiers and four Comin's High Duty heads, under automatic control.

French System.—For the manufacture of worsted yarns under the French System of Drawing and Spinning the machinery was made by the Société Alsacienne de Constructions Mécaniques, and the equipment consists of the following: Model P. L. B. comb with creel for 24 doublings, intersecting gill box (2 heads) equipped with oiling device, gill box (2 heads), first drawing (2 heads), second drawing (2 heads), third drawing (2 heads), reducer (4 porcupines), slubber (8 porcupines), first intermediate (8 porcupines), second intermediate (8 porcupines), rover (8 porcupines), finisher (16 porcupines), self-acting worsted mule (150 spindles).

The Saco-Lowell Shops built and installed a ring spinning frame of 60 spindles for worsted yarns equipped with individual General Electric Company's motor and a Reeves Variable Speed Transmission.

Twenty-one turbo humidifier heads automatically controlled by a humidity regulator have been furnished by the G. M. Parks Company. The compressed air for these heads is supplied by an Ingersoll-Rand 8 by 8 steam-driven air compressor.

Testing Equipment.—For routine mill and research testing a conditioning room is provided which is humidified by G. M. Parks Company equipment.

Testing machines include the following: Henry L. Scott & Company skein and fabric tester; one Emerson conditioning oven with Toledo scales; one Bausch & Lomb projecting microscope for fiber analysis; one Alfred Suter top stapling machine with scales; one top inspection stand with duplex mercury lamp lighting; one Edgerton stroboscope; five copper bowls for scouring by hand; complete set of U. S. wool standards for fiber comparison.

Design and Power Weaving Department.—In the fabric analysis section there have been provided chemical balances made by Volland & Sons and Christian Becker, necessary twist testers, microscopes, reels, etc., as well as a Torsion calculation balance made by the Torsion Balance Company.

In the warp preparation department there has been installed by the Saco-Lowell Shops one of its spoolers, and a slasher for preparing cotton warps; also a high speed warper, by T. C. Entwistle Company. The Whitin Machine Company has supplied a 180-spindle, long chain quiller, and the Johnson & Bassett Company, a quiller of its make. The Universal Winding Company has supplied a winder for cop and bobbin winding and an 8 spindle doubler, also a winder for the high speed warper.

The woolen and worsted warp preparation department contains two 40-end jack spoolers, two spool racks for 12 spools each, one pattern dry frame dresser, one pipe and cylinder dresser, one 60-inch reel, one 82-inch reel, and one double head beamer, all supplied by the Davis & Furber Machine Company.

The Weaving Department contains four looms supplied by the Draper Corporation, which include a plain Northrup, an 8-harness corduroy, an improved Northrup, a Northrup with dobby. The Stafford Loom Company has installed one plain, one cam, one dobby loom and one broad sheeting loom, all equipped with

individual motors; the Whitin Machine Works, a side cam twill, a plain print cloth loom, equipped with Kip-Armstrong electric warp stop motion; Crompton & Knowles Loom Works a jean loom and a plain loom with individual drive. Four of these looms are equipped with Abbott cleavers made by the Abbott Wire and Cast Steel Warp Cleaving Company. The Hopedale Manufacturing Company installed one of its high speed looms with individual motor.

The fancy loom section includes a Stafford Ideal 16-harness automatic shuttle-changing loom, a Whitin 20-harness dobby loom, and the following furnished by the Crompton & Knowles Loom Works: Knowles gingham 4 by 1 boxes, Crompton gingham 4 by 1 boxes, one Crompton towel 2 by 1 boxes, two Terry towel and one huck towel looms, a 20-harness dobby 4 by 1 boxes, fancy leno loom, and a Crompton fancy cotton single cylinder 20-harness dobby.

The woolen and worsted section contains a Knowles 20-harness Gem, a Crompton 24-harness worsted 4 by 4 boxes, a Crompton 6 by 1 double cylinder 20-harness dobby, one heavy 20-harness 4 by 4 boxes, one 20-harness and one 25-harness blanket, seven intermediate woolen 25-harness 4 by 4 boxes and two 90-inch 25-harness heavy woolen looms.

The Jacquard loom section includes one Stafford silk loom, 1,200-hook, Halton head; one 400-hook, single-lift Schaum & Uhlinger Jacquard, mounted for 4-bank, narrow fabric loom; one Skinner Brussels carpet loom, three-quarters wide, equipped with 1,280-hook Jacquard head presented by the Bigelow-Hartford Carpet Company. The Crompton & Knowles Loom Works has furnished one Knowles fancy loom, single-lift Jacquard; one Knowles fancy loom, double-lift Jacquard; one Knowles fancy loom, Jacquard tied up for leno, one Knowles loom, 4 by 4 boxes, 54-inch, with 600-hook, double-lift, double-cylinder McMurdo Jacquard head, tied up for damask napkin designs; one Crompton & Knowles 72-inch tapestry loom, with 2,600-hook Halton Jacquard head, one 840-hook, double-lift, single-cylinder Jacquard on Crompton & Knowles 4-bank ribbon loom, one 800-hook, double-lift Knowles Gem silk brocade Jacquard machine, 4 by 4 boxes.

The silk loom section includes one Stafford silk loom, 20-harness dobby, 2 by 1 box motion, sliding bar warp stop motion, filling feeler, extended beam stands, motor drive; one Crompton & Knowles silk loom, 4 by 4 box motion, 20-harness head motion, individual motor drive.

For the purpose of card cutting there has been furnished one Jacquard fine index card-cutting machine by John Royle & Sons; one Jacquard French index card-cutting machine by the same concern.

Chemistry and Dyeing Department.—The Chemistry Laboratory consists of one to give instruction in General Chemistry and Qualitative Analysis and provides facilities to take 120 students. The Quantitative Laboratory takes care of some 50 students and contains the necessary drying closet, steam bath, electrolytic table. The Balance Room has eleven analytical balances made by such concerns as Christian Becker, Eimer & Amend, and H. L. Becker's Sons & Company. The Organic Laboratory has facilities to take care of approximately 25 students having the necessary equipment required in the preparation of basic organic compounds and instruments used in the manufacture of dyes such as autoclaves, electric and gas combustion furnaces.

The Engineering Chemistry Laboratory contains the following equipment: a Becker chainomatic Westphal balance, a Stormer viscosimeter, a Doolittle viscosimeter, an Engler viscosimeter, Saybolt viscosimeters, Pensky-Martin flash tester, Cleveland open cup flash tester, Mahler oxygen bomb calorimeter, Emerson oxygen bomb calorimeters, Parr peroxide bomb calorimeter, Parr sulphur bomb, New York State closed testers, carbon residue apparatus, Orsat flue gas apparatus, Hempel gas analysis apparatus, and the usual chemical apparatus and analytical balances.

The Chemical Textile Testing Laboratory contains the following: a Scott serigraph strength tester, a Scott single strand strength tester, a Freas drying oven and Becker analytical balance for moisture determinations, a mercury arc lamp for ultra violet, a fadeometer, a launderometer, yarn reels, a twist counter, an extraction apparatus, a centrifuge, a Scott regain indicator, a barometer, a Hygrodeik hygrometer, Sling psychrometers, a DuNuoy tensiometer, a Zeiss dipping refrac-

tometer, an Abbé fractometer, a Gaertner spectroscope, a polariscope, a MacBeth color matching lamp, a Mackay cloth oil tester, a Duboseq colorimeter, a Lovibond tintometer, and the usual chemical apparatus and analytical balances.

The Microscopy Laboratory has been equipped with the following: a polarizing chemical microscope, twelve ordinary microscopes, a Minot rotary microtome, a Spencer table microtome, a Zeiss comparison ocular, Chalet lamps, individual lamps, Silvermann illuminators, mechanical stages, dark ground illuminators, a vertical illuminator, a camera lucida, polarizing equipment, an arc lamp, stools, microscope tables, and the usual auxiliaries.

The Microbiology Laboratory contains in addition to microscopes, lamps and other individual equipment, a horizontal gas heated autoclave, a small vertical autoclave, two electric incubators, a sterilamp unit, an electric oven, balances, including a chainomatic analytical balance, and a high vacuum unit for micro-aerophilic experiments. Small equipment such as electric slide warmer, electric hot stage, etc., is also included.

The Photography and Photomicroscopy Laboratory equipment is as follows: Bausch and Lomb horizontal photomicrographic apparatus, Leitz vertical photomicrographic apparatus, Lucas vertical photomicrographic apparatus, Wratten filters, Klieg lamps, dark-room lamps, a projection printer, a graphic camera with focal plane shutter; also much small apparatus such as tanks, trays, washers, etc.

The Chemical Museum has been provided with cases and representative dye-stuffs all furnished by various dyestuff manufacturers of this country and abroad. This offers an unparalleled opportunity for students to study and experiment with almost all of the representative dyes which are used in the textile industry.

The Experimental Dyeing Laboratory is equipped with fifty-six steam heated dyeing baths and individual benches, reels and balances. There is also an ageing chamber and a Philadelphia Drying Machinery Company's Hurricane Dryer besides a large collection of dyestuffs.

The Experimental Printing Laboratory is equipped with a power-driven, full-sized, two-roll calico printing machine, and a smaller one-roll, power-driven printing machine, both made by Rice, Barton & Fales, and a small hand-driven, laboratory printing machine, an iron-jacketed steaming chamber, and a set of steam-jacketed copper kettles.

To give instruction in dyeing on a basis which is more comparable with commercial practice there is provided a laboratory which includes the following equipment: a small kier, fitted with E. D. Jefferson's circulating device, a Permutit filter; a mercerizing machine, raw stock and yarn dyeing machines, Klauder-Weldon Dyeing Machine Company; a jig dyeing machine; a set of drying cans; a chain dyeing machine; a raw stock drying table; a padding mangle; a hydro-extractor; a Psarski experimental dyeing machine, a Hussong experimental dyeing machine, equipped for raw stock or yarns, a Rodney Hunt sample piece dyeing machine, equipped with an automatic temperature and pressure-regulating apparatus, made by C. J. Tagliabue Manufacturing Company. The Franklin Process Company has furnished a 25-pound bronze dyeing machine.

Finishing Department.—The Woolen and Worsted section includes a motor-driven Clipper cloth 4-string washer, a fulling mill, and a combination fulling and washing mill for jersey fabrics, furnished by the Rodney Hunt Company; a sample fulling mill, a kicker mill, furnished by James Hunter & Company; an up and down dry gig, a rolling and stretching machine, an up and down wet gig, a steam finishing machine, a 60-inch, 3-burner singeing machine, adapted for cotton, silk or worsted goods, a 2-cylinder double-acting brushing machine. Curtis & Marble Machine Company has furnished a 60-inch 4-cylinder sanding and polishing machine; a mantle steaming and air cooling machine, equipped with a direct connected motor and a Nash pump; and a 66½-inch motor driven, single woolen shear, equipped with list saving motion; a 6-4 double shear, an A. W. C. measuring and weighing machine, furnished by Parks & Woolson; a dewing machine, a 6-4 Voelker rotary press, furnished by G. W. Voelker & Co.; a tentering and drying machine furnished by John Heatcote; a single crabbing machine, H. W. Butterworth & Son; a 72-inch woolen napper donated by Davis & Furber; a 32-inch basket hydro-extractor, W. H. Tolhurst; a Lintz & Eckhardt cloth numbering machine, from Durbrow & Hearne Company; a steam press for underwear, United States Hoffman

Company; a sewing machine, Birch Brothers; a trimming and overseaming machine, The Merrow Machine Company.

The Cotton section includes a 40-inch inspecting and brushing machine, a 44-inch No. 25 railway sewing and rolling machine, a 44-inch cotton shearing machine, Type No. 34, a 44-inch No. 3 steam calender rolling machine, a 40-inch cloth folder, a 40-inch winder and measurer, a set of 44-inch shear blades for grinding purposes, furnished by Curtis & Marble Machine Company; a 48-inch No. 4 opening, sewing and rolling machine, a No. 1 hand power portable railway sewing machine, furnished by Dinsmore Manufacturing Company; a 40-inch 4-tank open soaping machine equipped with patent flushing rolls, brass and rubber squeeze rolls and spiral openers, furnished by Birch Brothers; an 84-inch 36-roll, ball bearing, double acting napper, equipped with a $7\frac{1}{2}$ -horsepower General Electric motor drive, furnished by Davis & Furber (the ball bearings were donated by the Fafnir Bearing Company); a 40-inch, 3-roll water mangle, with husk and brass rolls and usual attachments and equipped with a 48-inch Mycock scutcher, and a 40-inch Mycock cloth expander made by Thomas Leyland & Company; a 40-inch, 2-roll starch mangle, a 40-inch upright drying machine with 10 copper cylinders equipped with Files dry can system; a 40-inch sprinkler, a 40-inch, 5-roll Universal calender with chasing attachment and equipped with a 40-inch Mycock cloth expander, a pasting table with plate, furnished by the Textile-Finishing Machinery Company; a 16 by 24 inch bronze-covered stretcher for the drying cans, C. A. Luther & Company; a 40-inch double bristle stretcher for drying cans, American Finishing Machinery Company; a trimming and overseaming machine, The Merrow Machine Company; a 40-inch Tommy Dodd starch mangle, and a 44-inch, 50-foot vibratory tentering machine, H. W. Butterworth & Sons Company. This machine is directly driven by a $7\frac{1}{2}$ -horsepower variable speed motor and is equipped with a Schwartz automatic electric guider, made by L. H. A. Schwartz & Company.

Engineering Department.—The Steam Engineering Laboratory contains the following equipment arranged for experimental purposes: A 50-horsepower Allis-Chalmers Corliss steam engine direct connected to an Alden absorption dynamometer, and piped to exhaust its steam to the atmosphere, to a Wheeler surface condenser or to the Kerr turbine; a Kerr seven-stage turbine driving directly a 25-kilowatt Richmond Electric Company's alternating current generator and piped to exhaust either to the atmosphere or the condenser. It may be operated either as high pressure or low pressure turbine, and the generator has special connections to illustrate various commercial phases. In addition there are a 4 by 6 Deane triplex power pump, two 2-inch centrifugal pumps made by Lawrence Machine Company, Lawrence, Mass., a Clayton air compressor and necessary tanks, scales and measuring instruments.

The Electrical Engineering Laboratory consists of two sections, one of which is devoted to instruction in the generation and transmission of power, and contains the necessary switchboard and instruments to control a 25-kilowatt alternating current turbo generator and a 15-kilowatt motor generator set arranged to supply either direct or alternating current. In addition there are a 24-horsepower direct current Allis-Chalmers motor and a 10-horsepower direct current General Electric motor, also a 10 and a 7.5 horsepower General Electric alternating current motor besides a General Electric 3-kilowatt rotary transformer and three Westinghouse stationary transformers. The other section is the instrument laboratory and is for the purpose of giving instruction in the measurement of current, voltage, resistance, and in the calibration of instruments. It is supplied with standard alternating and direct current measuring instruments of a wide range of sizes and capacities. A 160 ampere hour storage battery offers a source of constant voltage. A standard Leeds & Northrup photometer with Lummer-Brodhun screen and Macbeth illuminometer provide means of illumination measurements.

Machine Shop.—The equipment of the machine shop is as follows: Four standard engine lathes, 13-inch swing, 6-foot bed, and an engine lathe, 18-inch swing, 10 foot bed; three standard engine lathes, 14-inch swing 6-foot bed, from Flather & Company; a standard engine lathe, 15-inch swing, 6-foot bed, from F. E. Reed Company; an engine lathe, 18-inch swing, 6 foot bed from Champion Tool Works; a standard engine lathe, 15-inch swing, 6-foot bed, from S. H. Putnam

Sons; one No. 1 Universal milling machine, with all three feeds automatic, from Kempsmith Manufacturing Company; one 24 by 24 inch, 6-foot planer, from the Mark Flather Planer Company; one 23-inch upright drill, with back gears and power feed, from J. E. Snyder & Son; one 14-inch single sensitive drill, from the Stanley Manufacturing Company; one No. 1 Universal grinder, from Landis Tool Company; five speed lathes, 17-inch swing, 5-foot bed, one 20-inch wet tool grinder, and one 12-inch, 2-wheel dry grinder, from J. G. Blount; one American twist drill grinder, from the Heald Machine Company; one Type 1B portable electric grinder from the Cincinnati Electric Tool Company; one 30-inch grindstone and frame, from the Athol Machine Company; a single spindle centering machine, from D. E. Whiton Machine Company; one 15-inch shaper, from Potter & Johnson; one power hacksaw, from the Fairbanks Company; one cold saw, from John T. Burr & Son; one Eureka metal power saw, Manning, Maxwell & Moore; one Type CC electric drill, Cincinnati Electric Tool Company; one Universal milling attachment for Kempsmith milling machine, and one Hisey Type B $\frac{1}{2}$ -horsepower tool post grinder, Taylor Machinery Company; one No. 2 Cory bench straightener, Manning, Maxwell & Moore; one No. 3 Universal cutter and reamer grinding machine, Browne & Sharpe; a well-equipped tool room containing a selected stock of the best makes of small tools, such as drills, taps and dies, milling cutters, reamers, gauges, micrometers, etc.

PRIZES AWARDED IN JUNE, 1941

The National Association of Cotton Manufacturers offers a medal to that member of the graduating class who maintains the highest standing throughout his course in Textile Engineering (General or Cotton Option) or the course in Cotton Manufacture. To *Leo Linden*.

The Proprietors of the Locks and Canals on the Merrimack River Scholarship at Massachusetts Institute of Technology. Several years ago the Proprietors of the Locks and Canals on the Merrimack River, a corporation owning the power rights on the Merrimack River in Lowell, gave to the Massachusetts Institute of Technology a sum of money to provide graduate scholarships to graduates from the Lowell Textile Institute who held a degree and were recommended by the trustees. Applicants must have maintained throughout their undergraduate courses a high scholastic record and must meet the requirements of the Graduate School of the Massachusetts Institute of Technology. To *Merlen C. Bullock*.

Louis A. Olney Book Prizes.—Prizes in the form of books are awarded each year to the successful candidate on graduation day. The conditions in detail are as follows:—

\$10 to the student graduating from the Chemistry and Textile Coloring course, who, not having already received recognition by appointment as an assistant instructor, shall have maintained the highest scholarship through the course. To *Salvatore J. Puliafico*.

\$10 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship during his second year. To *Richard E. Petersen*.

\$5 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship during his second year. To *Albert S. Messer*.

\$10 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship in first-year Chemistry. To *Edwin M. Gottlieb*.

\$5 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship in first-year Chemistry. To *Joseph B. Masaschi*. Honorable Mention: *Paul J. Martin* and *Samuel Weinstein*.

STUDENT ACTIVITIES AND ORGANIZATIONS

School Publications.—The Text is issued bi-weekly and it contains news pertaining to activities in the Institute as well as information concerning alumni. The Pickout is an annual publication in charge of a manager and editor selected from the senior class. The board is composed of representatives from the various classes.

Fraternities.—There are four fraternities, three of which are national and one is local. They afford opportunity for social life desired in a college career.

Dramatic Club.—The Dramatic Club gives a theatrical program annually. Appropriation is made from the profits to the treasury of the Athletic Association.

Professional Clubs.—The Textile Engineering Society is composed of all students registered in the Textile Engineering Course. The society holds meetings at which speakers are heard. The Student Chapter of the American Association of Textile Chemists and Colorists sponsors meetings addressed by speakers on technical subjects.

Rifle Club.—The rifle club offers opportunity to all students to attain proficiency in marksmanship and selects the team for interscholastic matches with other colleges.

Honor Society.—To degree candidates who have maintained a high scholarship for three years' work, or who have met with certain similar requirements, is accorded the honor of membership in the society Tau Epsilon Sigma. Relatively a membership in this society corresponds to that in some of the well-known honor societies of the liberal arts and scientific colleges. It requires constant attendance and application to the work of the course for any student to reach the scholarship level entitling him to this membership.

Honor Roll.—The President's List includes upper classmen taking a regular course who have a general average of eighty percent and no deficiencies.

Student Book Store.—A book store is operated on the cooperative plan by the Lowell Textile Associates, Inc., for the benefit and convenience of students who desire to purchase books, supplies, and other materials for use in connection with their work. It is conducted by a manager and two clerks, all of whom are undergraduates. The general business policy is under the control and supervision of a member of the Faculty. Any student may become an associate member of the Lowell Textile Associates, Inc., upon payment of the required fee and is thereby entitled to discount privileges when purchasing from the Book Store and from certain firms in the city of Lowell.

Alumni Association.—The Alumni Association of the Institute holds its annual meeting and banquet in May of each year.

The membership of the association is composed of graduates of the day courses and is open to any non-graduate who has attended the Institute for at least one year.

OFFICERS FOR THE YEAR 1941-42

James A. Irvine, '17, *President*

Gilbert R. Merrill, '18, *Vice-President*

A. Edwin Wells, '20, *Secretary-Treasurer*

Communications should be addressed to A. Edwin Wells, Lowell Textile Institute.

EXECUTIVE COMMITTEE

Roy H. Bradford, '06

James F. Dewey, '04

Parker F. Dunlap, '34

John G. Echmalian, '16

Charles H. Forsaith, '20

Edwin D. Fowle, '24

Olin D. Gay, '08

Milton Hindle, '25

Robert F. Jessen, '36

Thomas Joy, '26

Francis P. Madden, '13

Kilburn G. Pease, '38

Richard W. Rawlinson, '31

Everett B. Rich, '11

J. Milton Washburn, Jr., '21

GRADUATES OF 1941

BACHELOR OF TEXTILE CHEMISTRY

THADDEUS BARDZIK
 *JOHN ANDREW CONDON, JR.
 *EDWARD JOSEPH EPSTEIN
 SIDNEY WILFRED FACTOR
 *SAUNDER FINARD
 *MATTHEW GASS
 *STEPHEN ARISTOPHANES GATZIMOS
 *ABRAHAM HECTOR GRONDIN
 GEORGE STEPHEN HIGGINBOTTOM
 *NORMAN ALFRED INKPEN
 CHARLES STANLEY KOULAS
 HAROLD LANDFIELD
 GEORGE DAVID McTEAGUE
 *FRANCIS VINCENT MAHONEY, JR.

NEIL JOSEPH MANNING
 *IRVING PAUL MINTZ
 *FRANCIS ARTHUR MURPHY
 *WALTER WALLACE PLATT
 *SALVATORE JOSEPH PULIAFICO
 *CHARLOTTE MERLINE RICH
 ANGUS HENRY ROBERTS
 *SIDNEY IRVING SALTSMAN
 *BASIL GEORGE SKALKEAS
 PAUL JOHN SULLIVAN
 FRANK JOHN SZYMOSEK
 *GEORGE ROBERT TURNER
 *GEORGE SAMUEL URLAUB
 *CLARENCE BERNARD WEIL

MASTER OF SCIENCE IN TEXTILE ENGINEERING

ROY GARVIN BUCK
 B.S. United States Naval Academy
 1933

HARLAN CYRIL COOPER
 B.S. United States Naval Academy
 1931

CHARLES ANDREWS JONES, JR.
 M.S. University of Wisconsin 1927

BACHELOR OF TEXTILE ENGINEERING

*DONALD MILES ADIE
 GERARD ALEXANDER
 BEN PITMAN BATCHELLER
 NEEDHAM BALLOU BROWN, JR.
 JOSE VIA GARI
 DONALD WILLIAM GUILFOYLE
 JOSEPH JAMES LANE, II
 *DOROTHY ELAINE LEWIS
 *LEO LINDEN
 *FREDERICK RUFUS MASON
 MAURICE MILBERG
 SEYMOUR OKUN

*DAVID PERNICK
 HENRY LELAND PERO
 *MAURICE GORDON PHILLIPS
 JOSE LUIS PORTILLA
 *BERNARD RASHKIN
 *LATHROPE A. SCHIFFER
 HENRY ANTHONY SINISKI
 JORDAN ALVIN TARTIKOFF
 *IRVING J. WOLF
 ALICE MARJORIE WOODARD
 RALPH JOHN ZELLWEGER

DIPLOMA IN COTTON MANUFACTURE

STEPHEN EDMUND PATRICK, JR.

DIPLOMA IN WOOL MANUFACTURE

ROBERT WILLIAM FEAD
 STANLEY ARTHUR GARNETT

MICHAEL JOSEPH KOROSKYS
 LESTER ALLEN MACKTEZ

DIPLOMA IN TEXTILE DESIGN

ARMAND EUGENE BLANCHARD

REGISTER OF DAY STUDENTS

GRADUATE STUDENTS

<i>Home Address</i>	<i>Lowell Address</i>
PLATT, WALTER WALLACE, IV, Lawrence, Mass. B.T.C., Lowell Textile Institute, 1941	_____
TWIGG, DONALD WHITMAN, VI, Reading, Mass. B.S., United States Naval Academy, 1933	_____
URLAUB, GEORGE SAMUEL, IV, Bellaire, L.I., N. Y. B.T.C., Lowell Textile Institute, 1941	5 White Street

UNDERGRADUATE STUDENTS

CANDIDATES FOR DEGREES

Class of 1942

ALLARD, ERNEST HERBERT, IV, Lowell, Mass.	78 Hanks Street
BAER, LEONARD HERMAN, VI, Brooklyn, N. Y.	Alpha Epsilon House
BOULE, RAYMOND GEORGE, IV, Lowell, Mass.	66 Mt. Hope Street
BROOK, JOHN FREDERICK, VI, Simcoe, Ont.	Phi Psi House
BULSON, DOUGLAS WHITNEY, VI, Lowell, Mass.	43 Plymouth Street
CAINE, PHILIP DANIEL, IV, Lowell, Mass.	89 Puffer Street
CARMICHAEL, ROBERT DANA, VI, Andover, Mass.	_____
COFFIN, WILLIAM BURTON, IV, Melrose, Mass.	_____
CORCORAN, LEONARD ROBERT, IV, Bradford, Mass.	_____
CORDEAU, GEORGES EDWARD, IV, Lowell, Mass.	1014 Lakeview Avenue
EICHNER, ALBERT DAVID, VI, Lowell, Mass.	103 School Street
HAMER, DAVID ORVILLE, JR., IV, Dracut, Mass.	_____
HAMILTON, ARTHUR THEODORE, IV, Lowell, Mass.	Omicron Pi House
HARPER, CYRIL NEWCOMB, IV, Wakefield, Mass.	_____
HUNTER, ROBERT ARNOLD, VI, Newburyport, Mass.	337 Beacon Street
JAMES, ERNEST PETER, IV, Haverhill, Mass.	_____
KENT, GEORGE STEPHEN, VI, Great Neck, L.I., N.Y.	298 Riverside Street
LAU, CHING SUT, VI, New York, N. Y.	236 Salem Street
LIANG, LELAND SUNG, VI, Hong Kong, China	337 Beacon Street
LISIEN, WALTER, IV, Lowell, Mass.	85 Whipple Street
MCCARTNEY, ROBERT WALLACE, IV, Lowell, Mass.	16 Sidney Street
McMAHON, JOSEPH JUSTIN, IV, Lowell, Mass.	7 Belmont Street
MANDIKOS, GEORGE JOHN, IV, Haverhill, Mass.	_____
MOREAU, ARTHUR JOSEPH, IV, Lowell, Mass.	45 West Street
MURPHY, JOHN ANTHONY, IV, Lowell, Mass.	123 Andrews Street
NOONAN, PAUL FRANCIS, IV, Lowell, Mass.	45 By Street
OPPENHEIM, MORTON LEWIS, VI, Lawrence, Mass.	_____
PAPPAS, VASIL JAMES, IV, Dracut, Mass.	_____
PINATEL, JOHN ANDRE, VI, Lowell, Mass.	Omicron Pi House
PRATT, CAROLINE ELIZABETH, IV, Lowell, Mass.	119 Fairmount Street
RAWLINSON, DUSTIN, IV, Hampstead, N. H.	148 Riverside Street
ROBERTS, RUSSELL FREDERICK, VI, Wollaston, Mass.	Phi Psi House
ROGOFF, DAVID, VI, Roxbury, Mass.	Alpha Epsilon House
ROUMAS, ZENON ANTHONY, IV, Peabody, Mass.	148 Riverside Street
SANFORD, GEORGE MORSE, JR., VI, Malden, Mass.	_____
SCARMEAS, HARRY, IV, Lowell, Mass.	21 Hancock Avenue
SCHIFFER, CLIFFORD ELAIS, IV, New York, N. Y.	298 Riverside Street
SCHILLER, WILLIAM, VI, Brookline, Mass.	5 White Street
SHAFTER, STUART FREDERIC, IV, Lowell, Mass.	373 Beacon Street
SHAPIRO, JEFFREY JOSEPH, VI, Brooklyn, N. Y.	103 School Street
SMITH, FRANCIS DUNHAM, VI, Dover-Foxcroft, Me.	137 Riverside Street
STAKLINSKI, WALTER ALBERT, VI, Rockville, Conn.	32 Colonial Avenue
SZOPA, STANLEY, IV, Lowell, Mass.	39 Beacon Street

Home Address

THOMAS, DONALD HENRY, IV, Medford, Mass.
 WEBB, RALPH PEABODY, VI, Dracut, Mass.
 WOLF, IRVING PAUL, IV, Brooklyn, N. Y.

Lowell Address

Alpha Epsilon House

Class of 1943

ALLARD, CLAUDE HENRY, IV, Lowell, Mass.
 ARMSTRONG, GEORGE GORDON, JR., VI, Littleton,
 Mass.

BASTERRECHEA, JUAN DE, IV, Habana, Cuba
 BEUTER, RALPH JULIUS, VI, Richmond Hill, N. Y.
 BRILLIANT, IRA FRANCIS, IV, Brooklyn, N. Y.
 BULLOCK, RALPH LOUIS, IV, Lexington, Mass.

COLBURN, JOHN ALLEN, IV, Dracut, Mass.
 COULMAN, MALCOLM PRESCOTT, IV, Saugus, Mass.

DAVIS, ESTHER ALICE, IV, Lowell, Mass.
 DEKALB, JOHN ERNEST, IV, Chelmsford, Mass.

DEMALLIE, PETER, IV, Lowell, Mass.
 DULIGAN, WILLIAM CHARLES, VI, Lowell, Mass.

FOISY, ROBERT WILLIAM, VI, Lowell, Mass.
 FOSTER, CLARENCE EVERETT, VI, Dracut, Mass.

FULLER, SAMUEL LLOYD, VI, Lowell, Mass.
 GARNETT, RICHARD HERBERT, VI, Edgewood, R. I.

GILICK, THOMAS JOHN, JR., VI, Lowell, Mass.
 GLEN, CORNELIUS LEONARD, JR., VI, Lowell, Mass.

GOLDBERG, HERBERT ARTHUR, VI, Boston, Mass.
 GRIFFIN, ROGER CASTLE, JR., IV, Needham, Mass.

HAGERTY, FRANCIS WILLIAM, VI, Lexington, Mass.
 HAGGERTY, WILLIAM THOMAS, IV, Lowell, Mass.

HARRISON, MAURICE WILLIAM, VI, Lowell, Mass.

HOCHSCHILD, REINHARD GEORGE, IV, Shelton, Conn.
 HOWARD, PHILIP JOHN, IV, North Andover, Mass.

JOHNSON, JOHN THOMAS, IV, Lowell, Mass.

KELLY, ALLAN WILLIAM, VI, Lowell, Mass.

KENNEDY, MATTHEW ANTHONY, VI, Lowell, Mass.

KITTAY, MORTON VICTOR, VI, New York, N. Y.

KRINTZMAN, EDWARD, VI, Worcester, Mass.

McMAHON, STILLMAN DILLON, IV, Lowell, Mass.

McNELLIS, JAMES STANISLAUS, IV, Lowell, Mass.

MAGAT, EUGENE, IV, New York, N. Y.

MALLON, JOHN FRANCIS, IV, Lawrence, Mass.

MESSER, ALBERT SIDNEY, IV, Ozone Park, N. Y.

MILLER, ALEX MICHAEL, VI, Perth Amboy, N. J.

MORTON, JACKSON WENTWORTH, IV, Egypt, Mass.

MURRAY, MARTIN PATRICK, IV, Lowell, Mass.

O'LEARY, LOUISE MARGARET, IV, Dracut, Mass.

PETERSEN, RICHARD EDWARD, IV, Concord, Mass.

PETRICEK, BRUNO, VI, Clifton, N. J.

QUEENEY, JOHN HART, VI, Scituate, Mass.

ROBERTS, DONALD CHESTER, VI, Chelmsford, Mass.

ROWEN, EDWARD JOSEPH, VI, West Roxbury, Mass.

SCHLESINGER, MORTON, IV, New York, N. Y.

SIDEBOTTOM, WILLIAM JAMES, IV, Milton, Mass.

SIEGEL, HAROLD, VI, Lowell, Mass.

SILBERSTEIN, ROBERT HERBERT, VI, New York, N. Y.

SULLIVAN, PAUL HENRY, IV, Haverhill, Mass.

TAYLOR, WILLIAM WARREN, VI, Chelmsford, Mass.

TEICHNER, ARTHUR CHARLES, IV, Chicago, Ill.

TYRIE, WALLACE ROLLEY, IV, Haverhill, Mass.

78 Hanks Street

9 White Street
 Omicron Pi House
 64 Mt. Hope Street

252 Middlesex Street

275 Gibson Street
 40 Saratoga Street
 55 Florence Road

R-2, Box 99
 Omicron Pi House
 47 South Walker Street
 R.F.D. No. 1
 Alpha Epsilon House
 337 Beacon Street

25 Robbins Street
 18 Bellevue Street
 123 Riverside Street

35 Barasford Avenue
 41 E Street
 19 Dracut Street
 Alpha Epsilon House
 Alpha Epsilon House
 7 Belmont Street
 74 Foster Street
 32 Colonial Avenue

236 Salem Street
 5 White Street
 38 Gershom Avenue
 30 Cosgrove Street

137 Riverside Street
 75 Fourth Avenue

65 Sterling Street
 Alpha Epsilon House
 Phi Psi House
 148 Riverside Street
 50 Standish Street

Alpha Epsilon House

Home Address

VALENTE, LOUIS JOSEPH, VI, South Barre, Mass.
 WEBSTER, FREDERICK LEONARD, JR., IV, Lowell,
 Mass.
 WIELICKA, EDWARD DOMINIC, IV, Lawrence, Mass.
 ZENORINI, HENRY JOHN, VI, Teaneck, N. J.

Lowell Address

87 Linden Street
 167 D Street
 Phi Psi House

Class of 1944

ALPERIN, GEORGE, IV, Haverhill, Mass.
 AVRAMOV, RUDI MARCO, VI, Forest Hills, N. Y.
 BELL, WALTER GEORGE, VI, Burlington, Ont.
 BERKOWITZ, JOSEPH HOWARD, VI, Yonkers, N. Y.
 BONTE, ANDRE ROGER, VI, Woonsocket, R. I.
 BRASSIL, ROBERT DANIEL, IV, Lowell, Mass.
 BRODERICK, THOMAS WILLIAM, VI, Pittsfield, Mass.
 CHAMBERS, EDWARD FRANCIS, VI, Webster, Mass.
 CHERENSON, ALAN HAROLD, VI, Lowell, Mass.
 CLOGSTON, SAMUEL MEIGHTON, VI, Lowell, Mass.
 DOO, VEE-BING, VI, Shanghai, China
 ECHAVARRIA, ALEXANDRO MAURICIO, VI, Medellin,
 Colombia, S. A.
 FARREN, ROGER PATRICK, IV, Medford, Mass.
 FINE, THEODORE, VI, Haverhill, Mass.
 GOLDBERG, JOSEPH M., IV, New York, N. Y.
 GOLDBERG, MELVIN DAVID, VI, Brookline, Mass.
 GOTTlieb, EDWIN MEYER, IV, New York, N. Y.
 GROSS, STANLEY FREDERICK, VI, Woodmere, N. Y.
 HAGGERTY, ISABEL FRANCIS, VI, Lowell, Mass.
 HALLETT, JOHN LAWRENCE, JR., VI, Lowell, Mass.
 HEALY, GRANT SAMUEL, VI, Webster, Mass.
 HELFGOTT, STANLEY LEE, VI, Brightwaters, N. Y.
 HIRN, JOHN EDWARD, JR., IV, East Hartford, Conn.
 JAY, MILTON JERRY, VI, Brooklyn, N. Y.
 KAPLAN, KALMAN, VI, Everett, Mass.
 KENIN, PHILIP, IV, New York, N. Y.
 KLASHMAN, JULIAN BERNARD, VI, Cambridge, Mass.
 KOPYCINSKI, JOSEPH VALENTINE, IV, Lowell, Mass.
 KOSOWICZ, JULIEN FRANK, VI, Lowell, Mass.
 LaFRANCE, HENRY JOSEPH, JR., IV, Tyngsboro, Mass.
 LANGLAIS, GEORGE OLIVER, IV, Lowell, Mass.
 LEITCH, JOHN BADGER, VI, Andover, Mass.
 LESHOWITZ, HAROLD, VI, Brooklyn, N. Y.
 MacLEAN, PHILIP EUGENE, IV, Swampscott, Mass.
 MAGOWN, ROBERT MALCOLM, IV, Medford, Mass.
 MAGUIRE, JOHN PAUL, VI, Lowell, Mass.
 MARCUS, MARTIN BERNARD, VI, Brookline, Mass.
 MARINOPOULOS, CHARLES, VI, Lowell, Mass.
 MARTIN, PAUL JOSEPH, IV, Lowell, Mass.
 MASASCHI, JOSEPH BERNARD, IV, Jamaica Plain,
 Mass.
 MERRILL, JOHN WALCOTT, IV, Tewksbury, Mass.
 MITCHELL, ALVIN EMERY, IV, Warwick, R. I.
 MURPHY, GEORGE CAMPBELL, IV, Buffalo, N. Y.
 NATH, VIRGINIA LOUISE, VI, North Chelmsford, Mass.
 NEWELL, WILLIAM ANDREWS, VI, Holyoke, Mass.
 NICKERSON, HOWARD LESLIE, JR., IV, Chelmsford,
 Mass.
 O'DONNELL, THOMAS FRANCIS, JR., VI, Lowell, Mass.
 O'LOUGHLIN, HELEN MARY, VI, Lowell, Mass.

272 Merrimack Street
 43 Plymouth Street
 Alpha Epsilon House
 137 Riverside Street
 404 Wentworth Avenue
 37 Varney Street
 Omicron Pi House
 71 Canton Street
 152 Wentworth Avenue
 87 Mt. Washington Street

15 Douglas Road

53 Mt. Hope Street
 146 Ludlam Street
 Alpha Epsilon House
 66 Riverside Street
 142 Riverside Street
 127 Fort Hill Avenue
 98 Wannalancit Street
 337 Beacon Street
 11 White Street
 11 White Street
 19 Mt. Hope Street
 32 Colonial Avenue
 272 Merrimack Street
 123 Riverside Street
 242 Branch Street
 15 Leverett Street

48 Riverside Street

53 Mt. Hope Street
 Omicron Pi House

31 Prospect Street
 Alpha Epsilon House
 234 Adams Street
 34 Sycamore Street

65 Sterling Street

272 Merrimack Street
 Phi Psi House

43 Plymouth Street

71 Canton Street
 562 Westford Street

Home Address

PROCTOR, RICHARD, IV, Lowell, Mass.
 PULIAFICO, CARMELO ROSARIO, IV, Barre Plains, Mass.
 QUINN, THOMAS GREGORY, JR., IV, Lowell, Mass.
 RABINOWITZ, IRVING MELVIN, VI, New York, N. Y.
 RICHARDSON, GEORGE FRANCIS, IV, Lowell, Mass.
 SASLOWSKY, SIDNEY, VI, New York, N. Y.
 SAYERS, JOHN TIMOTHY, JR., IV, Lowell, Mass.
 SILK, JAMES FRANCIS, IV, Lowell, Mass.
 SMOLER, IRWIN CHARLES, VI, New York, N. Y.
 SPANOS, GEORGE PETER, IV, Lowell, Mass.
 SPOFFORD, RAY MILTON, VI, Haverhill, Mass.
 STROMVALL, ERNEST MALCOLM, JR., IV, Lowell, Mass.
 WALWOOD, JOHN THOMAS, IV, Lowell, Mass.
 WEINSTEIN, SAMUEL, IV, Brooklyn, N. Y.
 WOITKOSKI, STEPHEN ANTHONY, VI, Pittsfield, Mass.

Lowell Address

187 Hovey Street
 59 Crescent Street
 3 Rhodora Street
 21 Mt. Hope Street
 7 Fairmont Street
 148 Riverside Street
 236 Princeton Boulevard
 67 Lamb Street
 Alpha Epsilon House
 14 West Bowers Street

19 Sheldon Street
 144 A Street
 Alpha Epsilon House
 37 Varney Street

Class of 1945

ABRAHAMS, ALLAN BERNARD, VI, Greenfield, Mass.
 AXELROD, GERALD ALVAN, VI, Brighton, Mass.
 BANASH, LEONARD DAVID, IV, Brookline, Mass.
 BAUER, JEROME FREDERICK, IV, Waterloo, Ont.
 BAUM, BERNARD OSCAR, IV, Brookline, Mass.
 BERKOWITZ, SIDNEY BERTRAM, VI, Boston, Mass.
 BLACKWELL, ANNE ELISE, VI, Harvard, Mass.
 BLOOM, MELVIN ABRAHAM, VI, Everett, Mass.
 BOHNY, ALFRED WALTER, IV, Hawthorne, N. J.
 BOMBARA, FRANCIS JEROME, VI, East Douglas, Mass.
 BOULE, WILFRED LEO, IV, Lowell, Mass.
 CHASE, GEORGE ALDEN, IV, Lowell, Mass.
 CHWALEK, FRANK JOHN, IV, Lawrence, Mass.
 CLEARY, LAURENCE TWOMEY, IV, Andover, Mass.
 COFFEY, JOHN FRANCIS, VI, Lowell, Mass.
 CURRAN, HENRY GEORGE, IV, Habana, Cuba
 DEMALLIE, STEPHEN POTTER, VI, Lowell, Mass.
 DOWLING, EDWARD MALLEY, IV, Wilmington, Mass.
 DRISCOLL, GEORGE ALPHONSUS, VI, Brighton, Mass.
 FIORY, WILLIAM JOHN JOSEPH, IV, Newburgh, N. Y.
 FRANK, ALLEN MORRIS, IV, Lowell, Mass.
 GARCIA, JULIO, VI, Santiago, Chile
 GILMAN, THEODORE HERBERT, VI, Brookline, Mass.
 GODET, JOHN RUSSELL, IV, Lowell, Mass.
 GRAHAM, WILLIAM FRANCIS, JR., VI, Haverhill, Mass.
 GREGG, JULIAN BARNES, VI, Worcester, Mass.
 GULUBICKY, EDWARD PAUL, IV, Haverhill, Mass.
 HOYLE, ALBERT GERARD, IV, Lowell, Mass.
 HUNSTEIN, ARTHUR WALTER, VI, New York, N. Y.
 ILLINGWORTH, SAM GROVEHAM, VI, Auburn, Me.
 JUREWICZ, ANTHONY GEORGE, VI, Lowell, Mass.
 KENNEDY, JAMES HARRINGTON, 3rd, VI, Lowell, Mass.
 KING, JAMES ROBERT, VI, Lowell, Mass.
 KIRSCHMAN, SAMUEL HARDING, VI, Brooklyn, N. Y.
 KLEIN, LEONARD, VI, Atlantic City, N. J.
 LAFFORD, GILBERT RODERICK, JR., IV, Gloucester,
 Mass.
 LANDRY, CHARLES JOSEPH, VI, Lowell, Mass.
 LANGER, MORTON FREDERICK, VI, New York, N. Y.
 LIDDY, HOWARD BANFORD, IV, Dracut, Mass.

53 Mt. Hope Street
 5 White Street
 43 Plymouth Street
 226 Riverside Street

43 Plymouth Street
 Y. W. C. A.
 32 Colonial Avenue
 337 Beacon Street
 64 Mt. Hope Street
 66 Mt. Hope Street
 37 Fourth Street

148 Sanders Avenue
 32 Colonial Avenue
 275 Gibson Street

37 Varney Street
 337 Beacon Street
 793 Merrimack Street
 15 Douglas Road
 5 White Street
 71 Agawam Street

337 Beacon Street

128 Mt. Hope Street
 32 Colonial Avenue
 9 White Street
 174 Concord Street
 177 A Street
 158 Howard Street
 Alpha Epsilon House
 43 Plymouth Street

137 Riverside Street
 348 Hildreth Street
 Alpha Epsilon House

Home Address

LINT, THEODORE MICHAEL, JR., VI, Neponsit, L. I., N. Y.
 McDougall, EARL ALLEN, VI, Waltham, Mass.
 McKNIFF, JOHN THOMAS, IV, Forge Village, Mass.
 McKONE, PETER JOSEPH, IV, Lowell, Mass.
 McMAHON, LAURENCE FRANCIS, IV, Lowell, Mass.
 McNALLY, ALAN MARTIN, IV, Lowell, Mass.
 MALCOLM, BRUCE BRUNDAGE, VI, Pittsfield, Mass.
 MASSEY, ALBERT JOSEPH, IV, Lowell, Mass.
 MEISTER, ROBERT BENJAMIN, IV, Maynard, Mass.
 MEYER, JOHN HARRY, VI, Norwich, Conn.
 MILGRIM, SIDNEY, IV, Brooklyn, N. Y.
 MIRANOWICZ, JOSEPH JOHN, IV, Lawrence, Mass.
 MOORE, THOMAS HAROLD, VI, Middletown, Conn.
 MORTON, GEORGE, VI, Lowell, Mass.
 MOSS, WARREN DONALD, VI, New York, N. Y.
 O'DONNELL, JAMES FRANCIS, IV, North Chelmsford, Mass.
 O'FLAHAVAN, JAMES MICHAEL, IV, Lowell, Mass.
 PEIRENT, ROBERT JOHN, IV, Lowell, Mass.
 PENNER, STUART EMANUAL, IV, Lawrence, N. Y.
 PERLMAN, SUMNER EARL, VI, Lawrence, Mass.
 PIEKARSKI, WILLIAM FABIAN, IV, Lowell, Mass.
 POIRIER, LUCIEN MAXIME, IV, Lowell, Mass.
 ROSENBAUM, JOSEPH HANS, IV, Lowell, Mass.
 ROUGHAN, JOHN MICHAEL, IV, Lowell, Mass.
 ROY, RAYMOND EMILE, IV, Lowell, Mass.
 ROZANSKI, MATTHEW, VI, Pittsfield, Mass.
 SANDNER, WALLACE, IV, Lawrence, Mass.
 SAYERS, THOMAS MARTIN, VI, Lowell, Mass.
 SCANNELL, JOHN PATRICK, VI, Lowell, Mass.
 SCHWARTZ, GERALD GORDON, VI, Manhattan, N. Y.
 SCHWARTZ, JOSEPH MICHAEL, VI, Brooklyn, N. Y.
 SHEEHAN, ALLAN GOSSELIN, VI, Lowell, Mass.
 SIEGEL, MELVIN, VI, New York, N. Y.
 SPICER, GEORGE WILLIAM, IV, Lowell, Mass.
 STROEBEL, RICHARD IRVING, JR., IV, Lawrence, Mass.
 STROUP, JOHN FRANCIS, JR., IV, Dorchester, Mass.
 SULLIVAN, JOHN EDWARD, VI, Lowell, Mass.
 SWEENEY, JAMES WILLIAM, VI, Lowell, Mass.
 TAMASAUSKAS, ALBERT EDMUND, IV, Lowell, Mass.
 VIAU, GEORGE ORLANDO, VI, Lowell, Mass.
 WEISER, SHERMAN ESTERMAN, IV, Forest Hills, N. Y.
 WERKOWSKI, STANLEY JOSEPH, VI, Lowell, Mass.
 WESTBROOKE, ERNEST WADE, IV, North Andover, Mass.
 WILBUR, EARL RAYMOND, IV, Lowell, Mass.

Lowell Address

32 Colonial Avenue
 29 Orleans Street
 7 Belmont Street
 55 South Whipple Street
 337 Beacon Street
 12 Carolyn Street
 137 Riverside Street
 Alpha Epsilon House
 Phi Psi House
 32 Colonial Avenue
 38 Plymouth Street
 62 Colonial Avenue
 1 Thompson Court
 5 White Street
 70 West Fourth Street
 39 Plymouth Street
 617 Westford Street
 30 Fort Hill Avenue
 381 Lincoln Street
 37 Varney Street
 236 Princeton Boulevard
 151 Princeton Boulevard
 32 Colonial Avenue
 19 Mt. Hope Street
 37 Henry Avenue
 Alpha Epsilon House
 19 Rhodora Street
 280 Beacon Street
 23 St. James Street
 574 Central Street
 12 Whitney Avenue
 Alpha Epsilon House
 39 Apple Street
 172 Shaw Street

DIPLOMA STUDENTS

Class of 1942

BROOK, GEORGE HENRY, II, Simcoe, Ont.
 CLARK, GEORGE CARLYLE, II, Methuen, Mass.
 DOLGE, DAVID BIGELOW, II, Hazardville, Conn.
 HARRIS, CARL WEBSTER, II, Concord, N. H.
 HASELTINE, ROBERT CLIFTON, II, Haverhill, Mass.
 GARNETT, EDITH KEIRSTEAD, III, Lowell, Mass.
 McELHINNEY, DOUGLAS HAMILTON, II, Lowell, Mass.
 PEARSALL, SAMUEL, II, Lowell, Mass.

Phi Psi House
 Omicron Pi House
 Omicron Pi House
 Omicron Pi House
 34 Chauncey Avenue
 Omicron Pi House
 337 Beacon Street

Home Address

PESETZKY, HERBERT, III, Lowell, Mass.
 RAND, WOODBURY HOLMES, II, Brookline, Mass.
 ROBINSON, JOHN BAILEY, II, Oxford, Me.
 WHITING, FRANK EDWARD, II, Andover, Mass.
 WILKINSON, VERNON LEE, I, Southbridge, Mass.

Lowell Address

75 Fourth Avenue
 50 Standish Street
 Omicron Pi House

Class of 1943

BENT, ROBERT MACE, JR., II, Worcester, Mass.
 ELLIS, ROBERT WARREN, II, North Billerica, Mass.
 FIELDSEND, ARTHUR TULL, II, Hudson, Mass.
 FRANK, ARTHUR JOSEPH, II, Lowell, Mass.
 MACDONALD, BARBARA TURNER, III, Rumford, R. I.
 WALL, JAMES THOMAS, II, Lowell, Mass.
 WEBER, ALFRED JULIUS, II, Clifton, N. J.

Phi Psi House
 28 Riverside Street
 72 Montview Avenue
 92 Stevens Street
 157 Pleasant Street
 43 Plymouth Street

Class of 1944

AMERIO, JOSEPH PETER, III, Pittsfield, Mass.
 BADMINGTON, SHERWOOD CUMMINGS, II, Newport,
 N. H.
 BAGGESSEN, ALVAN FREDERICK, II, Concord, Mass.
 GUIMARAES, PAULO MOURAO, I, Rio de Janeiro,
 Brazil
 LARIVIERE, STEPHEN GERARD, III, Southbridge,
 Mass.
 LOMBARDI, VINCENT DANIEL, JR., II, Montclair, N. J.
 MARKEY, BERNARD JOSEPH, III, Lowell, Mass.
 STAMATELOS, GEORGE THADEAS, II, Hillsboro, N. H.

37 Varney Street
 Omicron Pi House
 53 Mt. Hope Street
 28 Riverside Street
 Phi Psi House
 275 Sumner Street
 509 Market Street

Specials

BENNETT, HUTCHINS COOLIDGE, VI, Lowell, Mass.
 BLOOM, JOSEPH, A.B., II, Brighton, Mass.
 DONNELLY, ELIOT MANNING, VI, Amsterdam, N. Y.
 FREEDMAN, ELI, A.B., II, Swampscott, Mass.
 GILLMAN, ROBERT RAYMOND, IV, Haverhill, Mass.
 HILL, UUNO MAKIS, III, Maynard, Mass.
 HUBERT, LEO REMY, III, Lowell, Mass.
 KRAVES, JOHN, III, Salem, N. H.
 LASAR, LIONEL, VI, Brooklyn, N. Y.
 McDUGALL, HOWARD JAMES, VI, North Billerica,
 Mass.
 MCKITTRICK, VERNON RUSSELL, VI, Lowell, Mass.
 NORGOL, CARLO, III, Maynard, Mass.
 NORGOL, WAINO JOHN, III, Maynard, Mass.
 RAMSBOTHAM, ERNEST, VI, Methuen, Mass.
 RAUSER, ERWIN FRANK, VI, Milwaukee, Wis.
 ROCKWELL, THOMAS PLUNKETT, II, North Andover,
 Mass.
 SANDNER, CHARLES RODNEY, IV, Lawrence, Mass.
 SCHOLZE, FREDERICK ERNEST, IV, New Milford,
 Conn.
 SHARPE, BERNARD WARREN, VI, Nashua, N. H.
 STOHN, ROBERT, VI, Middleboro, Mass.
 STOHN, WILLIAM THOMAS, III, Middleboro, Mass.
 WALKER, JOSEPH ALOYSIUS, III, Lowell, Mass.

68 Jenness Street
 326 Salem Street
 142 Riverside Street

 113 School Street

 123 Riverside Street

 19 Hawthorne Street

 50 Standish Street

 137 Riverside Street

 Phi Psi House
 Phi Psi House
 10 Sutherland Street

ALPHABETICAL LIST OF GRADUATES

Master of Science degree was first given in 1936. Other degrees were issued beginning with the year 1913 as follows: B.T.C.—Bachelor of Textile Chemistry; B.T.D.—Bachelor of Textile Dyeing; B.T.E.—Bachelor of Textile Engineering. A diploma is indicated by D and a certificate (covering a partial course only) by C.

The following list has been corrected in accordance with information received previous to February 1, 1941. Any information regarding incorrect or missing addresses is earnestly solicited.

A

- Abbot, Edward Moseley, II, '04 (D).**
President and General Manager, Abbot
Worsted Co., Graniteville, Mass.
- Abbott, George Richard, II, '08 (D).**
Tree Warden, Andover, Mass.
- Acar, Ibrahim Zeki, VI, '38 (M.S.).**
General Textile Engineer, Malatya Textile
Mills, Malatya, Turkey.
- Adams, Floyd Willington, VI, '16 (B.T.E.).**
- Adams, Henry Shaw, I, '05 (D).**
Assistant Treasurer, The Springs Cotton Mills,
Chester, S. C.
- Adams, Tracy Addison, IV, '11 (D).**
Vice-President and General Manager, Arnold
Print Works, No. Adams, Mass.
- Adie, Donald Miles, VI, '41 (B.T.E.).**
Ensign, U. S. Naval Reserve.
- Aigen, Lawrence, VI, '40 (B.T.E.).**
Inspector of Textiles, U. S. Army Quarter-
master Depot, Philadelphia, Pa.
- Albrecht, Charles Henry, IV, '17 (B.T.C.).**
Chief Chemist, Atlantic Mills, Providence, R. I.
- Alexander, Gerard, VI, '41 (B.T.E.).**
Industrial Research Engineer, Division of
Commerce, State Office Bldg., Albany, N. Y.
- Allard, Edward Joseph, IV, '31 (B.T.C.).**
Salesman and Demonstrator, National Aniline
Division, Allied Chemical & Dye Corp.,
Providence, R. I.
- Allen, Grover Stanley, IV, '34 (B.T.C.).**
With M. T. Stevens & Sons Co., Haverhill,
Mass.
- Almquist, George John Edwin, I, '19 (D).**
Second Vice-President, Passaic-Bergen Lum-
ber Company, Passaic, N. J.
- Anderson, Arthur Ilman, IV, '24 (B.T.C.).**
Textile Chemist, Superintendent of Research,
American Institute of Laundering, Joliet, Ill.
- Anderson, Arthur Julius, IV, '19 (B.T.C.).**
Salesman, National Aniline Division, Allied
Chemical & Dye Corp., 40 Rector St., New
York, N. Y.
- Anderson, Clarence Alfred, VI, '25 (B.T.E.).**
Cost Department, Hathaway Mfg. Company,
New Bedford, Mass.
- Anderson, Harold Robert, II, '26 (D).**
With Abbot Worsted Company, Forge Village,
Mass.
- Annan, David, II, '23 (D).**
119 Waltham Street, West Newton, Mass.
- Anthony, Henry Steere, Jr., IV, '36 (B.T.C.).**
Assistant Chemist, Tyer Rubber Company,
Andover, Mass.
- Appel, Mrs. Bessie L. (Lifland, Bessie) IV, '32
(B.T.C.).**
Assistant Chemist, Massachusetts Knitting
Mill, Jamaica Plain, Mass.
- Arienti, Peter Joseph, IV, '10 (D).**
Chief Chemist and Superintendent of Dyeing,
Sayles Finishing Plants, Inc., Saylesville, R. I.
- Arundale, Henry Barnes, II, '07 (D).**
177 Beacon Street, Boston, Mass.
- Atwood, Henry Jones, II, '23 (D).**
Agent, Amos Abbott Company, Dexter, Me.
- Babigan, Raymond, IV, '24 (B.T.C.).**
Examiner, U. S. Patent Office, Washington,
D. C.
- Bachelder, Charles Edward, IV, '24 (B.T.C.).**
Superintendent of Acetate Rayon Division,
Tennessee Eastman Corporation, Kingsport,
Tenn.
- Bagshaw, Herbert Arthur Edward, VI, '32
(B.T.E.).**
Time Study Department, Worsted Division,
Pacific Mills, Lawrence, Mass.
- Bailey, Lester Harold, IV, '24 (B.T.C.).**
With U. S. Finishing Company, Sterling, Conn.
- Bailey, Walter James, IV, '11 (D).**
Bailey's Cleansers and Dyers, Watertown,
Mass.
- Baker, Franz Evron, VI, '26 (B.T.E.).**
Assistant Professor, Cotton Yarn Department,
Lowell Textile Institute, Lowell, Mass.
- Baker, Maurice Sidney, IV, '25 (B.T.C.).**
Merchant, Baker's Dress Goods Shop, Nor-
wood, Mass.
- Baker, Phyllis Jeanne, VI, '39 (B.T.E.).**
Textile Analyst, Laboratory Division, War-
wick Mills, Boston, Mass.
- Baker, William John, IV, '16 (D).**
Plant Superintendent, E. I. du Pont de
Nemours & Co., Buffalo, N. Y.
- Balch, Ralph Herman, VI, '29 (B.T.E.).**
Development Engineer, Celanese Corporation
of America, Amelco, Md.
- Baldwin, Frederick Albert, II, '04 (D).**
President, Federal Clothing Manufacturing
Company, Ltd., Sherbrooke, Que.
- Banta, John Garrett, VI, '39 (B.T.E.).**
Ensign, U. S. Naval Air Corps, Jacksonville,
Fla.
- Bard, Morry Arnold, IV, '30 (B.T.C.).**
President and Textile Chemist, Silver Line Dye
Works, Inc., New York City.
- Bardzik, Thaddeus, IV, '41 (B.T.C.).**
Junior Inspector of Textiles, U. S. Army
Quartermaster Depot, Philadelphia, Pa.
- Barlofsky, Archie, VI, '17 (B.T.E.).**
Attorney at law, Barlofsky & Barlofsky,
Lowell, Mass.
- Barr, I. Walwin, I, '00 (D).**
Secretary, Buckley Brothers Company, Inc.,
881 Broadway, New York City.
- Barrett, Andrew Edward, IV, '23 (B.T.C.).**
Field Engineer, Armour & Co., North Bergen,
N. J.
- Barry, Leo Joseph, II, '27 (D).**
With Bell Company, Worcester, Mass.
- Barry, Marie Gertrude, IV, '32 (B.T.C.).**
Colorist, National Aniline Division, Allied
Chemical & Dye Corporation, Buffalo, N. Y.
- Basdikis, Charles Apostolos, IV, '36 (B.T.C.).**
Electrical Designer, Stone & Webster Engi-
neering Corporation, Boston, Mass.
- Bassett, Louis Loss, VI, '37 (B.T.E.).**
Manufacturer, Glenbar Fabrics, Lowell, Mass.
- Batcheller, Ben Pitman, VI, '41 (B.T.E.).**
Aviation Cadet, Maxwell Field, Montgomery,
Ala.
- Bates, Wesley Elliott, VI, '36 (B.T.E.).**
2514 Blakemore Ave., Nashville, Tenn.
- Bauer, Frank Norbert, I, '39 (D).**
Superintendent, Bauer's Ltd., Waterloo, Ont.
- Bauer, Harold Conrad, III, '28 (D).**
With Henry Bauer, Lawrence, Mass.

B

- Beattie, John Silas, IV, '35 (B.T.C.).**
Technician, American Viscose Corporation, Marcus Hook, Pa.
- Beauregard, Albert Joseph, VI, '39 (B.T.E.).**
Designer and Stylist, Worumbo Manufacturing Company, 51 Madison Avenue, New York City.
- Beck, Frederic Christian, II, '24 (D).**
In business. Weld & Beck, Southbridge, Mass.
- Beeman, Earl Royal, VI, '30 (B.T.E.).**
General Foreman, Kendall Mills, Colrain, Mass.
- Beigbender, Edgar Raymond, IV, '34 (B.T.C.).**
Assistant Colorist, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Bell, Edward Benjamin, IV, '24 (B.T.C.).**
Sub-agent, Calgon, Inc., Lowell, Mass.
- Beltrami, Kenneth Charles, VI, '40 (B.T.E.).**
With Deering-Milliken Co., New York, N. Y.
- Bennett, E. Howard, II, '03 (C).**
Publisher, American Wool and Cotton Reporter, 530 Atlantic Avenue, Boston, Mass.
- Bentley, Byron, II, '26 (D).**
Superintendent and General Manager, Joseph Bentley Hair Company, Methuen, Mass.
- Bergeron, Alvin Wilfred, IV, '29 (B.T.C.).**
Textile Chemist, Celanese Corporation of America, Amelle, Md.
- Berry, Wilbur French, II, '17 (D).**
Superintendent, Thomas Kay Woolen Mill, Salem, Oreg.
- Bertrand, Arthur Leon, IV, '32 (B.T.C.).**
Inspector of Textiles, War Department, Philadelphia Quartermaster Depot, Philadelphia, Pa.
- Bethel, Ion Maywood, VI, '39 (M.S.) (B.S., Texas Agricultural and Mechanical College, 1925).**
Major, U. S. Marine Corps, Depot of Supplies, Philadelphia, Pa.
- Bienstock, George Jerrard, III, '24 (D).**
Stylist, Designer, Yorkshire Worsted Mills, New York City.
- Billings, Borden Dickinson, I, '29 (D).**
- Bird, Clarence Henry, II, '22 (D).**
Yarn Superintendent, Schuster Woollen Company, Inc., East Douglas, Mass.
- Bird, Francis John, VI, '22 (B.T.E.).**
Attorney-at-Law, 227 Bronson Building, Attleboro, Mass.
- Birtwell, John Lincoln, IV, '34 (B.T.C.).**
With the Kendall Mills, Walpole, Mass.
- Blaikie, Howard Mills, II, '11 (D).**
- Blake, Parker Gould, VI, '14 (D).**
Salesman, G. Whitaker & Co., Ltd., Peterborough, Ont.
- Blanchard, Armand Eugene, III, '41 (D).**
Soldier, U. S. Army, Military Police Detachment, 58th Street and 1st Avenue, Brooklyn, N. Y.
- Blanchard, John Lawrence, II, '23 (D).**
- Bodwell, Henry Albert, II, '00 (D).**
Ludlow Manufacturing & Sales Company, 211 Congress Street, Boston, Mass.
- Bogdan, John Francis, VI, '35 (B.T.E.).**
With Manville Jenckes Corporation, Manville, R. I.
- Bone, Arthur Peter Stuart, VI, '39 (B.T.E.).**
Sales, Arthur Bone, Inc., Los Angeles, Calif.
- Booth, James Mooney, IV, '24 (B.T.C.).**
Technical Sales, The Huron Milling Company, 9 Park Place, New York City.
- Bordett, Sidney Morris, VI, '37 (B.T.E.).**
Salesman, La France Industries, Boston, Mass.
- Bottomley, John, III, '28 (D).**
Assistant Technician, Joshua L. Bailey & Co., 40 Worth Street, New York City.
- Boyd, William, Jr., IV, '40 (B.T.C.).**
Head Chemist, Chicago Laboratory, Ciba Co., Inc., 325 West Huron Street, Chicago, Ill.
- Boynnton, Bradford Lewis, II, '35 (D).**
Treasurer and Clerk, Wholesale Ski Equipment Business, Middlebrook & Boynnton, Inc., North Conway, N. H.
- Bradford, Edward Hosmer, VI, '35 (B.T.E.).**
Assistant to Overseer of Carding, Manville-Jenckes Corporation, Manville, R. I.
- Bradford, Harold Palmer, II, '25 (D).**
- Bradford, Roy Hosmer, II, '06 (D).**
Examiner, Appraiser, Reconstruction Finance Corporation, 161 Devonshire Street, Boston, Mass.
- Bradford, William Swanton, VI, '31 (B.T.E.).**
General Foreman, E. W. Twitchell, Inc., Philadelphia, Pa.
- Bradley, Raymond Frost, VI, '14 (D).**
Garage Proprietor, Twin Light Garage, 267 East Main Street, Gloucester, Mass.
- Bradley, Richard Henry, V, '01 (C).**
Gasoline Salesman, Fairhaven, Mass.
- Brainerd, Arthur Travena, IV, '09 (D).**
Manager, Ciba Company, Inc., 325 West Huron Street, Chicago, Ill.
- Brainerd, Carl Emil, IV, '20 (B.T.C.).**
Dyer, F. C. Huyck & Sons, Albany, N. Y.
- Brandt, Carl Dewey, VI, '20 (B.T.E.).**
Research Engineer, Whitin Machine Works, Whitinsville, Mass.
- Brannen, Leon Vincent, III, '07 (C).**
- Brantman, Jackson Agmor, VI, '39 (B.T.E.).**
1326 Service Unit, Q. M. D. No. 1, Camp Lee, Va.
- Brickett, Raymond Calvin, II, '14 (D).**
Overseer, M. T. Stevens & Sons Company (Marland Mills), Andover, Mass.
- Bridges, Herbert Gardner, II, '34 (D).**
Manager and Representative, The New Hampshire Company, Portsmouth, N. H.
- Brigham, Howard Mason, VI, '24 (B.T.E.).**
Sales and Manufacturing Executive, Wellington, Sears Co., 65 Worth Street, New York City.
- Broadhurst, Russell Denton, IV, '38 (B.T.C.).**
2 Laurel Street, Middletown, Conn.
- Bronson, Howard Seymour, II, '27 (D).**
Overseer of Knitting, Portage Hosiery Company, Portage, Wis.
- Brosnan, William Francis, IV, '27 (B.T.C.).**
Superintendent, F. P. Maupai Dyeing Co. Inc., 660 57th Street, West New York, N. J.
- Brown, Gerald Marston, VI, '22 (B.T.E.).**
- Brown, Needham Ballou, Jr., VI, '41 (B.T.E.).**
Textile Engineer, Celanese Corporation of America, Cumberland, Md.
- Brown, Philip Franklin, II, '23 (D).**
Assistant Sales Director, E. I. du Pont de Nemours, Rayon Division, Wilmington, Del.
- Brown, Rollins Goldthwaite, IV, '12 (D).**
Representative, Investors Syndicate, Chamber of Commerce Building, Boston, Mass.
- Brown, Russell Lee, VI, '21 (B.T.E.). '40 (M.S.).**
Professor of Textiles; in charge Department of Woolen Yarns, Lowell Textile Institute, Lowell, Mass.
- Brown, Will George, Jr., IV, '22 (B.T.C.).**
Sales Engineer, Wallerstein Company, 180 Madison Avenue, New York City.
- Buchan, Donald Cameron, II, '01 (D).**
Assistant Superintendent, M. T. Stevens & Sons Company, North Andover, Mass.
- Buchan, Norman Spaulding, IV, '26 (B.T.C.).**
Textile Chemist, Newmarket Manufacturing Company, Lowell, Mass.
- Buck, Roy Garvin, Lieutenant (S.C.) U.S.N., VI, '41 (M.S.). (B.S., 1933, U. S. Naval Academy.)**
Textile & Clothing Inspection Officer, Naval Clothing Depot, Brooklyn, N. Y.
- Buckley, Herman Timothy, IV, '39 (B.T.C.).**
Assistant Chemist, J. L. Stifel & Sons, Wheeling, W. Va.
- Bukala, Mitchell John, IV, '34 (B.T.C.).**
Chemist, Massachusetts Mohair Plush Company, Lowell, Mass.
- Bullock, Merlen Clarke, VI, '40 (B.T.E.).**
Graduate Student, Massachusetts Institute of Technology, Cambridge, Mass.
- Burbeck, Dorothy Maria, IV, '20 (B.T.C.).**
See Garlick, Mrs. Dorothy M.
- Burger, Samuel Joseph, III, '24 (D).**
- Burke, James Edward, Jr., IV, '34 (B.T.C.).**
Police Officer, Lowell Police Department, Lowell, Mass.
- Burnham, Frank Erwin, IV, '02 (D).**
Chemist and Dyer, Henry Klous, Inc., Lawrence, Mass.
- Burns, Robert, IV, '28 (B.T.C.).**
- Burt, Joseph Frederic, VI, '31 (B.T.E.).**
Assistant to Superintendent, Abbot Worsted Company, Forge Village, Mass.
- Buzzell, Harry Saville, VI, '29 (B.T.E.).**
Supervisor, Oxford Paper Company, Rumford, Maine.

C

- Calder, Marian Brownson, VI, '37 (M.S.), (B.S. 1930, College of Industrial Arts, Texas State College for Women.)
With Good Housekeeping Institute, New York City.
- Callahan, John Joseph, Jr., II, '26 (D).
Color Chemist, Technicolor Motion Picture Corporation, Boston, Mass.
- Cameron, Elliott Francis, IV, '11 (D).
Attorney-at-law, Willard, Allen and Mulkern, 100 Milk Street, Boston, Mass.
- Campbell, Alexander, VI, '23 (B.T.E.).
Plant Engineer, Arlington Mills, Lawrence, Mass.
- Campbell, Allan, Jr., VI, '32 (B.T.E.).
Decorator, A. & A. Campbell Co., South Boston, Mass.
- Campbell, Andrew Morris, IV, '40 (B.T.C.).
Chemist, Pacific Mills, Lawrence, Mass.
- Campbell, Louise Porter, IIIb, '03 (C).
With Ginn & Co., 15 Ashburton Place, Boston, Mass.
- Campbell, Orison Sargent, II, '03 (D).
President and Manager, Industrial Felts, Ltd., Kitchener, Ont.
- Cannell, Philip Stuart, VI, '23 (B.T.E.).
Hotel Proprietor, Carlton Hotel, Malden, Mass.
- Carbone, Alfred John, IV, '31 (B.T.C.).
Chemist, Sandoz Chemical Works, Philadelphia, Pa.
- Carleton, Joseph Raddin, III, '30 (D).
Manager, Defense Division, Bridgeport Fabrics, Inc., Bridgeport, Conn.
- Carr, George Everett, I, '05 (D).
343 5th Street, Ridgefield Park, N. J.
- Çarr, Paul Edward, II, '24 (D).
Manager of Woolen Division, L. C. Chase & Co., Inc., 295 Fifth Avenue, New York City.
- Carter, Robert Albion, IV, '02 (D).
Dyestuff Salesman, E. I. du Pont de Nemours & Co., Greenfield, Reading, Pa.
- Carter, Russell Albert, II, '25 (D).
Textile Engineer, Hampton Company, Easthampton, Mass.
- Cary, Julian Clinton, VI, '10 (D).
Connecticut Manager, The American Mutual Liability Insurance Company, 15 Lewis Street, Hartford, Conn.
- Casey, Francis Harold, IV, '31 (B.T.C.).
Textile Chemist, Sandoz Chemical Works, Inc., Boston, Mass.
- Caya, Ferdinand Joseph, IV, '22 (B.T.C.).
Textile Technologist, Better Fabrics Testing Bureau, Inc., New York, N. Y.
- Chamberlin, Frederick Ellery, I, '03 (D).
Overseer of Spinning, Monument Mills, Housatonic, Mass.
- Chandler, Proctor, IV, '11 (D).
With Packard Mills of Webster, at Caryville, Mass.
- Chang, Chi, VI, '23 (B.T.E.).
- Chang, Wen Chuan, VI, '21 (B.T.E.).
- Chapman, Mrs. Boyd P., Jr. (O'Donoghue, Eileen Margaret) VI, '39 (B.T.E.).
153 Emmons Street, Franklin, Mass.
- Chapman, Leland Hildreth, VI, '24 (B.T.E.).
Teacher, High School, Hingham, Mass.
- Chen, Shih Ching, IV, '22 (B.T.C.).
- Chen, Wen-Pei, IV, '24 (B.T.C.).
- Church, Charles Royal, II, '06 (C).
Teacher, San Diego High School, San Diego, Calif.
- Churchill, Charles Whittier, III, '06 (D).
Manager, Churchill Manufacturing Company, Inc., Lowell, Mass.
- Clark, Earl William, IV, '18 (B.T.C.).
Research Chemist, National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.
- Clark, Thomas Talbot, II, '10 (D).
President and Treasurer, Talbot Mills, North Billerica, Mass.
- Clarke, George Dean, II, '21 (C).
410 South Ardmore Avenue, Los Angeles, Calif.
- Clayton, Harold Edmund, VI, '21 (B.T.E.).
Treasurer and Manager, Clayton Hosiery Mills, Inc., Lowell, Mass.
- Cleary, Charles Joseph, II, '13 (D).
Principal Materials Engineer, United States Army Air Corps, Dayton, Ohio.
- Clement, David Scott, IV, '24 (B.T.C.).
Overseer of Dyeing, Nashua Manufacturing Company, Nashua, N. H.
- Cleveland, Richard Sumner, VI, '30 (B.T.E.).
1st Lt., Office Quartermaster General, U. S. Army, Washington, D. C.
- Clifford, Albert Chester, VI, '22 (B.T.E.).
Textile Engineer, Western Electric Company, Inc., Kearny, N. J.
- Clogston, Raymond B., IV, '04 (D).
Superintendent of Dyeing, Merrimack Manufacturing Company, Lowell, Mass.
- Cluett, John Girvin, I, '29 (D).
Assistant Superintendent of Shirt Laundry, Cluett, Peabody & Co., Inc., Troy, N. Y.
- Coan, Charles Bisbee, IV, '12 (D).
Salesman and Demonstrator, American Aniline Products Company, Boston, Mass.
- Cobb, Joseph Calvin, VI, '36 (B.T.E.).
Office Manager and Representative, Middlesex Paper Tube Company of New Jersey, Trenton, N. J.
- Cobin, Arthur Edward, IV, '23 (B.T.C.).
With National Hosiery Dyeing and Finishing Works, Boston, Mass.
- Coffey, Daniel Joseph, III, '28 (D).
Blanket Inspector, F. C. Huyck & Sons, Rensselaer, N. Y.
- Cohen, Leonard Lee, II, '39 (D).
Designer, S. Stroock & Co., Newburgh, N. Y.
- Cohen, Raphael Edvab, IV, '25 (B.T.C.).
Sales Manager, Merrimack Paper Tube Company, Inc., Lowell, Mass.
- Colby, J. Tracy, VI, '16 (D).
Sales Manager, F. C. Huyck & Sons, Empire State Building, Room 3318, New York City.
- Colby, Vernon Warren, IV, '40 (B.T.C.).
Assistant Dyer, J. L. Stifel & Sons, Inc., Wheeling, W. Va.
- Colby, Willard Alvah, Jr., IV, '30 (B.T.C.).
Overseer of Dyeing, Danvers Bleachery, Peabody, Mass.
- Cole, Edward Earle, IV, '06 (D).
Manager, Haverhill Credit Bureau, Haverhill, Mass.
- Collonan, Herbert Joseph, II, '22 (D).
With Potter & Collonan, Moosup, Conn.
- Coman, James Groesbeck, I, '07 (D).
General Manager, Mexia Textile Mills, Mexia, Texas.
- Conant, Harold Wright, I, '09 (D).
Assistant Treasurer and Director, United Elastic Corporation, Easthampton, Mass.
- Conant, Richard Goldsmith, I, '12 (D).
Vice-President in charge of Colored Goods, Wellington, Sears Company, 65 Worth Street, New York City.
- Condon, John Andrew, Jr., IV, '41 (B.T.C.).
Chemist, Cowan Mill, Lewiston, Md.
- Conklin, Jennie Grace, IIb, '05 (C).
See Nostrand, Mrs. William L.
- Connolly, Daniel Francis, Jr., VI, '35 (B.T.E.).
6 Ward Street, Lynn, Mass.
- Connor, Thomas Francis, II, '28 (D).
Court Officer, Superior Court, Suffolk County, Boston, Mass.
- Connorton, John Joseph, III, '27 (D).
Assistant Agent, Amoskeag Fabrics, Inc., Manchester, N. H.
- Cook, Kenneth Bartlett, I, '13 (D).
Vice-President in Charge of Manufacturing, Manville-Jencks Company, Manville, R. I.
- Cooper, Harlan Cyril, VI, '41 (M.S.). (B.S. 1931, U. S. Naval Academy.)
Captain, Asst. O. I. C. Testing Laboratory, U. S. Marine Corps Depot, Philadelphia, Pa.
- Corbett, James Francis, IV, '28 (B.T.C.).
Chemist, Pacific Mills, Print Works Division, Lawrence, Mass.
- Cote, Theodore Charles, IV, '26 (B.T.C.).
Captain, Medical Administration Corps, U. S. Army, Fort Devens, Mass.
- Cowan, Raymond Bernard, IV, '35 (B.T.C.).
Of Cowan & Shain, Haverhill, Mass.
- Craig, Albert Wood, IV, '07 (D).
Superintendent, Windsor Print Works, North Adams, Mass.

- Craig, Clarence Eugene, III, '02 (D).
1730 Centre Street, West Roxbury, Mass.
- Crane, Eugene Francis, II, '33 (D).
With East Weymouth Wool Scouring Company, East Weymouth, Mass.
- Crawford, Robert Thomas, VI, '36 (B.T.E.).
Assistant Superintendent, Acetate Staple Department, Tennessee Eastman Corporation, Kingsport, Tenn.
- Creese, Guy Talbot, IV, '14 (D).
General Manager, Creese & Cook Company, Danversport, Mass.
- Crowe, Joseph Bailey, IV, '25 (B.T.C.).
Director of Laundry and Textile Research, Procter & Gamble Co., Ivorydale, Ohio.
- Culver, Ralph Farnsworth, IV, '04 (D).
Manager and Director, Ciba Company, Inc., 61 Peck Street, Providence, R. I.
- Cummings, Edward Stanton, VI, '16 (D).
Industrial Engineer, Ralph E. Loper Company, Greenville, S. C.
- Curran, Charles Ernest, III, '02 (C).
Head Designer, Wood Worsted Mills, Lawrence, Mass.
- Currier, John Alva, II, '01 (D).
Mechanical Superintendent, M. T. Stevens & Sons Co., North Andover, Mass.
- Curtin, William John, IV, '35 (B.T.C.).
District Manager, Lowell Sun, Lowell, Mass.
- Curtis, Frank Mitchell, I, '06 (D).
Salesman, Barney Carey Company, Milton, Mass.
- Curtis, William Leavitt, II, '05 (C).
- Cutler, Benjamin Winthrop, Jr., III, '04 (D).
Department Manager, Worth Textile Company, 40 Worth Street, New York City.

D

- Daley, Charles Lincoln, IV, '34 (B.T.C.).
Instructor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.
- Dalton, Gregory Smith, IV, '12 (D).
- Daly, William James, VI, '37 (B.T.E.).
Textile Inspector, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.
- Darby, Avarad Nelson, II, '28 (D).
Merrimac Hat Corporation, Greenville, Ala.
- Datar, Anant Vithal, VI, '24 (B.T.E.).
Managing Director, Venkatesh Rang Tantu Mills, Inchalkaranji, S. M. Cy., India.
- Davidson, Sydney, III, '28 (D).
- Davieau, Alfred Edward, VI, '16 (D).
Textile Consulting Engineer, United States Testing Company, Inc., 1415 Park Avenue, Hoboken, N. J.
- Davieau, Leon Arthur, VI, '23 (B.T.E.).
Textile Engineer, United States Rubber Company, Passaic, N. J.
- Davis, Alexander Duncan, VI, '14 (B.T.E.).
Instructor, Northeastern University, Springfield, Mass.
- Davis, Arthur Sabin, IV, '40 (B.T.C.).
Textile Chemist, F. C. Huyck & Sons, Albany, N. Y.
- Dearborn, Roy S., VI, '13 (D).
With Real Estate Department, Andover Savings Bank, Andover, Mass.
- Del Plaine, Parker Haywood, IV, '25 (B.T.C.).
Southern Manager, Rohm & Hass Company, Inc., 110 Independent Building, Charlotte, N. C.
- Dempsey, Phillip Edward, IV, '33 (B.T.C.).
Chemist, American Aniline Products, Inc., Boston, Mass.
- Derby, Roland Everett, IV, '22 (B.T.C.).
Chemical Laboratory, The Derby Company, Lawrence, Mass.
- Derzawetz, Joseph, VI, '39 (B.T.E.).
U. S. Naval Reserve, Navy Yard, Boston, Mass.
- de Sa, Francisco, VI, '18 (B.T.E.).
Avenue da Graca, Bahia, Brazil.
- Dewey, James French, II, '04 (D).
Woolen Manufacturer, A. G. Dewey Company, Quechee, Vt.
- Dewey, Maurice William, II, '11 (D).
Investments, National Life Insurance Company, Montpelier, Vt.

- Dick, Henry Kendal, Jr., VI, '39 (B.T.E.).
With Celanese Corporation of America, Narrows, Va.
- Dillon, James Henry, III, '05 (D).
- Dion, Ernest Lorenzo, IV, '35 (B.T.C.).
Chemist, Zinsser & Company, Hastings-on-Hudson, N. Y.
- Dods, James Barber, II, '27 (D).
Vice-President, The Dods Knitting Company, Ltd., Orangeville, Ont.
- Dolan, William Francis, IV, '28 (B.T.C.).
- Donald, Albert Edward, II, '04 (D).
Agent, H. T. Hayward Company, Franklin, Mass.
- Donohoe, Edward Joseph, VI, '34 (B.T.E.).
Manager, New York Laboratory, United States Testing Company, Inc., 1430 Broadway, New York City.
- Donovan, Joseph Richard, IV, '24 (B.T.C.).
- Doran, Wilbur Kirkland, II, '22 (D).
Real Estate and Insurance, W. K. Doran Agency, Bristol, N. H.
- Dorr, Clinton Lamont, VI, '14 (D).
General Manager, Raymond's, Inc., 356 Washington Street, Boston, Mass.
- Douglas, Walter Shelton, II, '21 (D).
Estimator, Douglas & Co., Lowell, Mass.
- Dudley, Albert Richard, VI, '33 (B.T.E.).
Chicopee Manufacturing Corporation, Manchester, N. H.
- Duggan, Paul Curran, IV, '31 (B.T.C.).
Dyer, Sussex Dye & Print Works, Newton, N. J.
- Duguid, Harry Wyatt, I, '24 (D).
Assistant Superintendent, Maverick Mills, East Boston, Mass.
- Dunlap, Kirke Harold, Jr., VI, '30 (B.T.E.).
Superintendent, Kenwood Mills, Ltd., Arnprior, Ont.
- Dunlap, Parker Frank, VI, '34 (B.T.E.).
Textile Engineer, Chicopee Manufacturing Corporation, Manchester, N. H.
- Dunnican, Edward Tunis, VI, '24 (B.T.E.).
Instructor in Textile Shop Practice, Passaic Public Schools, Passaic, N. J.
- Durgin, William Ernest, IV, '24 (B.T.C.).
Textile Chemist, Geigy Company, Inc., 88 Broad Street, Boston, Mass.
- Dursin, Louis Jules, II, '36 (D).
Superintendent, Rochambeau Worsted Company, Providence, R. I.
- Duval, Joseph Edward, II, '10 (D).
Sales Manager, Massachusetts Mohair Plush Company, 3701 North Broad Street, Philadelphia, Pa.
- Dwight, John Francis, Jr., II, '08 (D).
Hazel Avenue, Scituate, Mass.

E

- Echavarria, Luis, VI, '35 (B.T.E.).
With Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia.
- Echecopar, Jesus Fortunato, VI, '33 (B.T.E.).
Director-Gerente de Eguren, Echecopar y Cia. S.A. and Profesor de Tecnologia Textil en Ia Escuela de Ingenieros, Lima, Peru.
- Echmalian, John Gregory, VI, '16 (B.T.E.).
Director, State Trade School, Manchester, Conn.
- Ehrenfried, Jacob Benjamin, II, '07 (C).
District Manager, U. S. Employment Service, Lewiston, Me.
- Eismann, Edmund, IV, '35 (B.T.C.).
Assistant Chemist, Fruit of the Loom, Inc., Pontiac, R. I.
- Ekstrand, Frederic Lawrence, II, '39 (D).
New England and New York Representative, Borne Scrymser Company, Elizabeth, N. J.
- Elliot, Gordon Baylies, II, '12 (D).
Planning Department, Pacific Mills, Worsted Division, Lawrence, Mass.
- Ellis, Charles Albert, VI, '21 (B.T.E.).
Engineer, Scott & Williams, Inc., Laconia, N. H.
- Ellis, Dorothy Myrta, VI, '25 (B.T.E.).
Economist, Department of Agriculture, Washington, D. C.

- Ellis, James Oliver, VI, '29 (B.T.E.).**
With Manville Jenckes Corporation, Manville, R. I.
- Engstrom, Karl Emil, VI, '12 (D).** (S.B. 1916,
Massachusetts Institute of Technology.
18 St. Luke Road, Allston, Mass.
- Enloe, Winfred Paige, I, '22 (D).**
Resident Agent, W. A. Handley Manufacturing Company, Roanoke, Ala.
- Epstein, Edward Joseph, IV, '41 (B.T.C.).**
872 South 16th Street, Newark, N. J.
- Esielionis, Victor John, I, '39 (D).**
Second Hand, Chicopee Manufacturing Corporation of N. H., Manchester, N. H.
- Evans, Alfred Whitney, III, '03 (D).**
Apartment 312, Realty Building, Rochester, N. H.
- Evans, Paul Richard, II, '29 (D).**
District Manager, Economics Laboratory, Inc., Philadelphia, Pa.
- Evans, William Robinson, III, '03 (D).**
309 Main Street, Bradford, Mass.
- Everett, Charles Arthur, IV, '19 (B.T.C.).**
Instructor, Dyeing Department, Lowell Textile Institute, Lowell, Mass.

F

- Factor, Sidney Wilfred, IV, '41 (B.T.C.).**
49 Pleasant Street, Haverhill, Mass.
- Fairbanks, Almonte Harrison, II, '09 (D).**
President and Manager, Fairwood Knitting Mills, Wakefield, Mass.
- Fairbanks, Evans Hobbs, VI, '35 (B.T.E.).**
With J. T. Reed & Co., Charlestown, Mass.
- Falk, Stanley, VI, '40 (B.T.E.).**
Inspector of Textiles, Quartermaster Depot, U. S. Army, Philadelphia, Pa.
- Farkas, Zoltan Roland, IV, '35 (B.T.C.).**
Textile Chemist, Casein Company of America, Bainbridge, N. Y.
- Farley, Clifford Albert, VI, '28 (B.T.E.).**
Physical Testing Laboratory, F. C. Huyck & Sons, Rensselaer, N. Y.
- Farmer, Chester Jefferson, IV, '07 (D).** (Ph.D.
Harvard University.)
Professor of Chemistry, Northwestern University Medical School, Chicago, Ill.
- Farnsworth, Harold Vincent, VI, '16 (B.T.E.).**
Textile Engineer, Atkinson, Haserick & Co., 152 Congress Street, Boston, Mass.
- Farr, Leonard Schaefer, II, '08 (D).**
With A. D. Ellis Mills, Inc., Monson, Mass.
- Farwell, Claude Chapman, VI, '23 (B.T.E.).**
Farwell Radio & Television Laboratory, Groton, Mass.
- Fasig, Paul Leon, IV, '28 (B.T.C.).**
Chemist, Bick & Co., Reading, Pa.
- Fead, Robert William, II, '41 (D).**
Aviation Cadet, U. S. Army Air Corps.
- Feinberg, Benjamin, II, '27 (D).**
With Copley Realty Company, Boston, Mass.
- Feindel, George Paul, IV, '24 (B.T.C.).**
Chief Chemist, Rock Hill Printing & Finishing Company, Rock Hill, S. C.
- Feldstein, Martin Alexander, VI, '24 (B.T.E.).**
Radio Engineer, Amplex Instrument Laboratories, New York City.
- Fels, August Benedict, II, '99 (D).**
- Ferguson, Thomas Dickson, VI, '32 (B.T.E.).**
With Gilbert Knitting Company, Little Falls, N. Y.
- Ferguson, William Gladstone, III, '09 (D).**
Assistant Agent, Ludlow Manufacturing Associates, Ludlow, Mass.
- Ferris, Arthur Leon, II, '28 (D).**
Port Rowan, Ont.
- Feuerstein, James Mayer, VI, '40 (B.T.E.).**
Production Manager, Malden Knitting Mills, Malden, Mass.
- Finard, Saunder, IV, '41 (B.T.C.).**
U. S. Naval Reserve—U.S.S. *Prairie State*.
- Finlay, Harry Francis, IV, '10 (D).**
Salesman and Demonstrator, National Aniline and Chemical Company, Boston, Mass.
- Fisher, Russell Todd, VI, '14 (D), '25 (B.T.E.).**
President & Secretary, National Association of Cotton Manufacturers, 80 Federal Street, Boston, Mass.
- Fiske, Starr Hollinger, II, '09 (D).**
119 Livingston Avenue, Lowell, Mass.
- Fitzgerald, John Francis, IV, '18 (B.T.C.).**
Fitzgerald's Cleansers, Winchester, Mass.
- Fitzgerald, John Francis, IV, '28 (B.T.C.).**
Manager, Textile Division, National Starch Products, Inc., 820 Greenwich Street, New York City.
- Fleischmann, Meyer, IV, '20 (B.T.C.).**
Chief Chemist, Real Silk Hosiery Mills, Inc., Indianapolis, Ind.
- Fleming, Frank Everett, IV, '06 (D).**
Superintendent, Dyeing and Finishing, Goodall Worsted Company, Sanford, Maine.
- Fletcher, Howard Varnum, III, '25 (D).**
With Colonial Beacon Oil Company, Hartford, Conn.
- Fletcher, Roland Hartwell, VI, '10 (D).**
Engineering Department, Pressed Steel Car Company, Pittsburgh, Pa.
- Flood, Thomas Henry, IV, '27 (B.T.C.).**
Chemist, National Aniline & Chemical Company, Toronto, Ont.
- Flynn, Thomas Patrick, IV, '11 (D).**
129 Edgell Street, Gardner, Mass.
- Ford, Edgar Robinson, IV, '11 (D).**
Technical Superintendent, Sayles Biltmore Bleacheries, Biltmore, N. C.
- Ford, Stephen Kenneth, IV, '28 (B.T.C.).**
Captain, Chemical Warfare Service, U. S. Army, Boston, Mass.
- Forsaith, Charles Henry, VI, '20 (B.T.E.).**
Superintendent, Nashua Manufacturing Company (Jackson Mills), Nashua, N. H.
- Forsaith, Ralph Allen, VI, '16 (B.T.E.).**
Nashua, N. H.
- Forsyth, Harold Downes, VI, '23 (B.T.E.).**
Treasurer, William Forsyth & Sons Company, Lynn, Mass.
- Forsythe, George, VI, '34 (B.T.E.).**
With Johnson & Johnson, New Brunswick, N. J.
- Foss, George Woodrow, II, '38 (D).**
Salesman, Naphthole, Inc., 80 Federal Street, Boston, Mass.
- Foster, Boutwell Hyde, VI, '17 (B.T.E.).**
Manager, Textile Section, United States Rubber Products, Inc., Passaic, N. J.
- Foster, Clifford Eastman, II, '01 (D).**
Textile Inspector, Quartermaster Corps, U. S. Army, Jeffersonville, Ind.
- Fowle, Edwin Daniels, VI, '24 (B.T.E.).**
New England Representative, Textile World, 1427 Stanley Building, Boston, Mass.
- Fox, David James, VI, '34 (B.T.E.).**
Assistant Superintendent, Horner Woolen Mills Company, Eaton Rapids, Mich.
- Fox, Kenneth Russell, VI, '38 (B.T.E.).**
Instructor, Textile Technology, Massachusetts Institute of Technology, Cambridge, Mass.
- Fox, Louise, VI, '40 (B.T.E.).**
Assistant Technician & Designer, Meyer Woolens, Inc., 580 Fifth Avenue, New York, N. Y.
- Fox, Theodore Webster, VI, '40 (B.T.E.).**
Assistant Textile Salesman, J. P. Stevens & Co., Inc., 44 Leonard Street, New York City
- Franks, Jerome, VI, '27 (B.T.E.).** (M.S. 1929,
Massachusetts Institute of Technology.)
With Marillyn Silk Mills, Phillipsburg, N. Y.
- Frederickson, Charles Joseph, Jr., IV, '29 (B.T.C.).**
Chemist, White & Hodges, Everett, Mass.
- Freedman, David, VI, '38 (B.T.E.).**
Service Manager, Textile Testing and Research Laboratories, 24 West 26th Street, New York, N. Y.
- French, Wallace Howe, IV, '31 (B.T.C.).**
Overseer of Bleaching & Dyeing, Atlas Underwear Company, Richmond, Ind.
- Frost, Harold Benjamin, II, '12 (D).**
Resident Manager, Liberty Mutual Insurance Company, Brockton, Mass.
- Fuller, Allen Reed, IV, '17 (B.T.C.).**
Textile Chemist, A. E. Staley Manufacturing Company, Decatur, Ill.
- Fuller, George, I, '03 (D).**
Textile Consultant, Cox and Fuller, 320 Broadway, New York City.
- Fyfe, Robert Clark, VI, '40 (B.T.E.).**
Sergeant, U. S. Army, Fort Jackson, S. C.

G

- Gagnon, Roland Joseph Octave, IV, '36 (B.T.C.).**
Laboratory Technician, United States Testing Company, Inc., Hoboken, N. J.
- Gahm, George Leonhard, II, '06 (D).**
Yarn Superintendent, Wood Worsted Mills Lawrence, Mass.
- Gainey, Francis William, IV, '11 (D).**
Colorist, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Gale, Harry Laburton, III, '10 (D).**
Designer, Iselin-Jefferson Company, 90 Worth Street, New York City.
- Gallagher, Arthur Francis, IV, '30 (B.T.C.).**
36 Merrill Street, Lowell, Mass.
- Gallagher, John Waters, II, '27 (D).**
Card Room Foreman, Newmann Endler, Inc., Danbury, Conn.
- Garcia, Lorenzo Montero, VI, '38 (B.T.E.).**
Technical Director, Cia. Textil "El Faisan" S. A., Mexico D. F., Mexico.
- Gari, Jose Via, VI, '41 (B.T.E.).**
"La Hormiga" Tizapan, D. F., Mexico
- Garlick, Mrs. Dorothy M. (Burbeck, Dorothy M.), IV, '20 (B.T.C.).**
192 Great Road, Maynard, Mass.
- Garner, Allen Frank, II, '30 (D).**
President, Kezar Falls Woolen Company, Kezar Falls, Me.
- Garnett, Stanley Arthur, II, '41 (D).**
Soldier, U. S. Army, 217 2M Co., 1326 Service Unit, Camp Lee, Va.
- Gass, Matthew, IV, '41 (B.T.C.).**
210 Hildreth Street, Lowell, Mass.
- Gatzimos, Stephen Aristophanes, IV, '41 (B.T.C.).**
Teacher, Dracut, Mass.
- Gaudet, Walter Urban, II, '29 (D).**
Insurance Broker and Advisor, Pawtucket, R. I.
- Gay, Clarence Russel, II, '39 (D).**
- Gay, Leon Stearns, Jr., II, '37 (D).**
Superintendent, Gaymont Mill, Ludlow, Vt.
- Gay, Olin Dow, II, '08 (D).**
President, Gay Brothers Company, Cavendish, Vt.
- Georgacoulis, George, IV, '36 (B.T.C.).**
Chemist, E. I. du Pont de Nemours, Arlington, N. J.
- Gerrish, Walter, III, '03 (D).**
- Getchell, Nelson Fletcher, IV, '38 (B.T.C.).**
Chemist and Dyer, Goodall Worsted Company, Sanford, Me.
- Gianaris, George Demetrios, VI, '39 (B.T.E.).**
Textile Inspector, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.
- Gifford, Alden Ives, Jr., VI, '34 (B.T.E.).**
Assistant to Superintendent, Pepperell Mfg. Co., Blanket Division, Biddeford, Me.
- Gill, John Schofield, IV, '40 (B.T.C.).**
With Pacific Mills, Worsted Division, Lawrence, Mass.
- Gillespie, Francis Clifford, IV, '34 (B.T.C.).**
With Osgood Mills, North Andover, Mass.
- Gillie, Stanley James, I, '22 (D).**
Southern Manager, United States Testing Company, Inc., Greensboro, N. C.
- Gillon, Sara Agnes, IIIB, '06 (C).**
- Gilman, Ernest Dana, II, '26 (D).**
Men's Wear Designer & Stylist, Pacific Mills, Worsted Division, 261 Fifth Avenue, New York City.
- Gleklen, Leo, IV, '32 (B.T.C.).**
Salesman & Demonstrator, United Aniline Company, Boston, Mass.
- Glowacki, Joseph, VI, '32 (B.T.E.).**
105 Salem Street, Andover, Mass.
- Glowinski, Mitchell, IV, '34 (B.T.C.).**
Colorist, Arlington Mills, Lawrence, Mass.
- Godfrey, Harold Thomas, VI, '26 (B.T.E.).**
Sales Engineer, Davis & Furber Machine Co., North Andover, Mass.
- Goldberg, George, VI, '10 (D).**
Manager, Liberty Lace and Braid Company, Boston, Mass.
- Goldenberg, Louis G., VI, '27 (B.T.E.).**
Teacher, Textiles and Science, Central High School of Needle Trades, New York City.
- Goldman, Moses Hyman, IV, '20 (B.T.C.).**
Civilian Allocation Specialist, Textile Division, W.P.B., Washington, D. C.
- Golec, Edward Lucian, III, '32 (D).**
Handkerchief Designer, Manhattan Shirt Company, New York City.
- Goller, Harold Poehlmann, II, '23 (D).**
Salesman, Clinton Sales Company, Inc., Greenville, S. C.
- Goodhue, Amy Helen, IIIB, '00 (C).**
See Harrison, Mrs. Arthur.
- Gooding, Francis Earle, IV, '19 (B.T.C.).**
Superintendent, Calco Chemical Company, Bound Brook, N. J.
- Goodwin, John Alden, VI, '40 (B.T.E.).**
Experimental Research, Whitin Machine Works, Whitinsville, Mass.
- Goosetrey, Arthur, IV, '21 (B.T.C.).**
With French Worsted Company, Woonsocket, R. I.
- Goosetrey, John Thomas, IV, '21 (B.T.C.).**
Superintendent of Dyeing and Bleaching, New York Mills Corporation, New York Mills, N. Y.
- Gotschalck, Lawrence William, VI, '28 (B.T.E.).**
Sales Office, Scott & Williams, Inc., 40 Worth Street, New York City.
- Gould, Norman Culver, VI, '19 (B.T.E.).**
Textile Designer, F. C. Huyck & Sons, Albany, N. Y.
- Graham, Robert Theodore, IV, '34 (B.T.C.).**
Inspection Department, Remington Arms Company, Utah Ordnance Plant, Salt Lake City, Utah.
- Greenbaum, Herbert Baron, III, '29 (D).**
- Greenbaum, Hyman Herbert, IV, '35 (B.T.C.).**
Proprietor, Exeter Food Center, Exeter, N. H.
- Greenberg, Archie, II, '21 (D).**
- Greendonner, George John, Jr., IV, '30 (B.T.C.).**
With National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
- Greene, John Lester, VI, '39 (B.T.E.).**
Assistant Textile Technologist, Quartermaster's Supply Office of U. S. Army, Brooklyn, N. Y.
- Greenwood, John Roger, II, '27 (D).**
Superintendent, W. W. Windle Company, Millbury, Mass.
- Gregory, Robert Crockett, VI, '34 (B.T.E.).**
Clothier, J. F. Gregory Sons Company, Rockland, Me.
- Griffin, Vernon Harcourt, IV, '35 (B.T.C.).**
Overseer of Dyeing and Finishing, Samson Cordage Works, Shirley, Mass.
- Grondin, Abraham Hector, IV, '41 (B.T.C.).**
Lieutenant, U. S. Army, Inspector, Chemical Warfare Service, Boston, Mass.
- Gross, Herman Peter, IV, '30 (B.T.C.).**
Plant Manager, Lincoln Rug Company, East Newark, N. J.
- Grossman, Clinton, IV, '38 (B.T.C.).**
Dyer, Lebanon Knitting Mills, Inc., Pawtucket, R. I.
- Guild, Lawrence Winfield, VI, '27 (B.T.E.).**
President, L. W. Guild Company, Inc., 140 Harrison Avenue, Boston, Mass.
- Guilfoyle, Donald William, VI, '41 (B.T.E.).**
Designer, Ayer Mill, Lawrence, Mass.
- Gwinnett, George Harry, II, '25 (D).**
Superintendent, Berkshire Woolen Company, Pittsfield, Mass.
- Gyzander, Arne Kolthoff, IV, '09 (D).**
Chemist, National Aniline Division, Allied Chemical & Dye Corp., 40 Rector Street, New York City.

H

- Haddad, Nassib, VI, '23 (B.T.E.).**
Textile Engineer, General Laboratory, United States Rubber Company, Passaic, N. J.
- Hadley, Richard Francis, IV, '22 (B.T.C.).**
Salesman, Parks & Woolson Machine Company, Springfield, Vt.
- Hadley, Walter Eastman, IV, '08 (D).**
Chief Chemist, Standard Coosa Thatcher Company, Rossville, Ga.
- Hadley, Wilfred Nourse, II, '22 (D).**
Manager, Parks & Woolson Machine Company, Springfield, Vt.

- Hager, Hazen Otis, II, '21 (C).**
Manager, Suburban Gas Company and Hagar Auto Parts, Portland, Me.
- Hakanson, Gustave Warren, IV, '37 (B.T.C.).**
Textile Chemist, Tennessee Eastman Corporation, Kingsport, Tenn.
- Hale, Alfred Sandel, IV, '09 (D).**
360 West Main Street, Rockaway, N. J.
- Hale, Ralph Edgar, IV, '31 (B.T.C.).**
Chemist, The Bell Company, Worcester, Mass.
- Hall, Frederick Kilby, VI, '24 (B.T.E.). (A.M. 1930, The George Washington University.)**
Inspector, United States Department of Agriculture, 801 Customhouse Building, Boston, Mass.
- Hall, Richard Thomas, IV, '40 (B.T.C.).**
Inspector, Quartermaster Corps, Jeffersonville, Ind.
- Hall, Stanley Arundel, IV, '31 (B.T.C.).**
Assistant Laboratory Engineer, New England Power Service Company, Providence, R. I.
- Halsell, Elam Ryan, I, '04 (C).**
1301 18th Avenue, Meridian, Miss.
- Hammond, Chester Twombly, II, '23 (D).**
Manager, Niagara Rug & Carpet Company, Inc., Buffalo, N. Y.
- Hanscom, Edwin Thomas, II, '27 (D).**
Superintendent, Dainty Maid Shoe Co., Haverhill, Mass.
- Hardie, Newton Gary, I, '23 (D).**
General Superintendent, Gossett Mills, Anderson, S. C.
- Hardman, Joseph Edwin, IV, '32 (B.T.C.).**
Textile Products Company, Sun Building, Lowell, Mass.
- Hardy, Philip Lewis, VI, '10 (D).**
Contractor, Andover, Mass.
- Hardy, Thomas Wadsworth, IV, '38 (B.T.C.).**
Chemist and Colorist, Calco Chemical Division, American Cyanamid Company, Boston, Mass.
- Harmon, Charles Francis, I, '99 (D).**
- Harpoott, Burgess Charles, VI, '38 (B.T.E.).**
185 Liberty Street, Lowell, Mass.
- Harrington, Thomas, IV, '15 (D).**
President, Hart & Harrington, 925 Weed Street, Chicago, Ill.
- Harris, Charles Edward, I, '05 (D).**
With Norwood Engineering Company, Florence, Mass.
- Harris, George Simmons, I, '02 (C).**
Forest Hill, Danville, Va.
- Harrison, Mrs. Arthur (Goodhue, Amy Helen), IIIB, '00 (C).**
- Hart, Arthur Norman, IV, '19 (B.T.C.).**
- Hart, Howard Roscoe, I, '23 (D).**
Vice-President, Brighton Mills, Inc., Shannon, Ga.
- Harwood, Ralph, IV, '35 (B.T.C.).**
Chemist and Colorist, Gotham Silk Hosiery Co., Philadelphia, Pa.
- Haskell, Walter Frank, IV, '02 (D).**
Overseer of Dyeing, Dana Warp Mills, Westbrook, Maine.
- Hassett, Paul Joseph, IV, '12 (D).**
Cortland Works Manager, L. C. Smith & Corona Typewriters, Inc., Cortland, N. Y.
- Hathaway, William Tabor, II, '26 (D).**
President, Hathaway Robinson Printing Company, Cambridge, Mass.
- Hathorn, George Wilmer, IV, '07 (D).**
Chemist, Lawrence Gas & Electric Company, Lawrence, Mass.
- Hathorne, Berkeley Lewis, IV, '24 (B.T.C.).**
Chemist, Berkeley Products Company, 114 East 32nd Street, New York City.
- Hay, Ernest Crawford, II, '11 (D).**
With Monomac Spinning Company, Lawrence, Mass.
- Haynes, Amos Kempton, IV, '29 (B.T.C.).**
Southern Sales Representative and Technician, Rohm & Haas Co., Inc., Atlanta, Ga.
- Heffernan, John Vincent, IV, '35 (B.T.C.).**
Dyer, Enterprise Dye Works, Woonsocket, R. I.
- Hegy, Gerard John Joseph, VI, '32 (B.T.E.).**
Dyer, Hegy's, Inc., Holyoke, Mass.
- Hendrickson, Walter Alexander, II, '11 (D).**
Superintendent, Max Lowenthal & Sons, Rochester, N. Y.
- Hennigan, Arthur Joseph, II, '06 (D).**
- Hetherman, Patrick Joseph, IV, '29 (B.T.C.).**
Teacher, Lowell High School, Lowell, Mass.
- Hibbard, Frederick William, IV, '25 (B.T.C.).**
Partner, Stock Brokerage Firm, Andrews & Hibbard, 701 Bay State Building, Lawrence, Mass.
- Higginbottom, George Stephen, IV, '41 (B.T.C.).**
Laboratory Technician, Geigy Company, Inc., 89 Barclay Street, New York, N. Y.
- Hildreth, Harold William, II, '07 (D).**
Westford, Mass.
- Hillman, Ralph Greeley, VI, '22 (B.T.E.).**
Production Manager, Samson Cordage Works, Boston, Mass.
- Hindle, Milton, VI, '25 (B.T.E.).**
Instructor, Department of Textile Engineering, Lowell Textile Institute, Lowell, Mass.
- Hintze, Thomas Forsyth, I, '06 (C).**
President, Vulcan Steel Products, Inc., Waycross, Ga.
- Hobson, Edward Shackford, III, '40 (D).**
Assistant Superintendent, Cowan Mill, Lewiston, Me.
- Hockmeyer, Clive Edward, Jr., I, '40 (D).**
Salt Lake City, Utah.
- Hockridge, Stanley Squire, IV, '32 (B.T.C.).**
Laboratory Assistant, Arnold Print Works, North Adams, Mass.
- Hodge, Harold Bradley, VI, '22 (B.T.E.).**
Engineer, Board of Education, Manchester, Conn.
- Hodgman, Richard Albert, VI, '36 (B.T.E.).**
Assistant Superintendent, Berkshire Division "A," Berkshire Fine Spinning Associates, Inc., North Adams, Mass.
- Hoffman, Richard Robert, II, '21 (C).**
- Holbrook, Ralph Wentworth, IV, '29 (B.T.C.).**
Chief Chemist and Chemical Purchasing Agent, Crompton Company, West Warwick, R. I.
- Holden, Arthur Newton, VI, '36 (B.T.E.).**
Designer, Suncook Mills, Suncook, N. H.
- Holden, Francis Crawford, IV, '09 (D).**
Chemist, Ludlow Manufacturing & Sales Company, Ludlow, Mass.
- Holden, John Sanford, II, '20 (D).**
Manufacturer, Automatic Machine Products Company, Attleboro, Mass.
- Holgate, Benjamin, III, '02 (C).**
Agent, Boott Mills, Lowell, Mass.
- Holgate, Benjamin Alexander, VI, '36 (B.T.E.).**
Textile Engineer, U. S. Army Air Corps, War Department, Wright Field, Dayton, Ohio.
- Hollings, James Louis, I, '05 (D).**
Eastern Sales Manager, Lithgow Corporation, 36 West 44th Street, New York, N. Y.
- Hollstein, William Diedrick, VI, '25 (B.T.E.).**
Physician, Westfield, N. J.
- Holmes, Otis Milton, VI, '13 (B.T.E.).**
Draftsman, United Shoe Machinery Corporation, Beverly, Mass.
- Holt, Laurence Currier, VI, '29 (B.T.E.).**
Textile Technician, Celanese Corporation of America, Anncle, Md.
- Hood, Leslie Newton, IV, '12 (D).**
R.F.D. No. 4, Box 164, Selma, Ala.
- Hook, Russell Weeks, IV, '05 (D).**
Textile Chemist, Arthur D. Little, Inc., 30 Charles River Road, Cambridge, Mass.
- Hooper, Clarence, IV, '27 (B.T.C.).**
Head Dyer, Armcro Finishing Corporation, Greensboro, N. C.
- Horne, James Albert, I, '24 (D).**
Salesman, Wellington, Sears Co., Inc., 65 Worth Street, New York City.
- Horsfall, George Gordon, II, '04 (C).**
Assistant Dyer, Interwoven Mills, Inc., Martinsburg, W. Va.
- Horton, Chester Temple, VI, '14 (B.T.E.).**
Wilmington, Mass.
- Hosmer, Frank Barbour, IV, '31 (B.T.C.).**
Salesman, U. S. Dyestuff Corporation, Boston, Mass.
- Houghton, Robert Kingsbury, IV, '23 (B.T.C.).**
Chief Chemist, Bigelow-Sanford Carpet Company, Thompsonville, Conn.
- Howard, Lorne Fernley, IV, '32 (B.T.C.).**
Production Chemist, B. B. Chemical Company, South Middleton, Mass.

- Howard, Winfield Hersey, IV, '38 (B.T.C.).**
Colorist, Ciba Company, Inc., 157 Federal Street, Boston, Mass.
- Howarth, Charles Lincoln, IV, '17 (B.T.C.).**
Assistant Professor of Dyeing, Lowell Textile Institute, Lowell, Mass.
- Howe, Woodbury Kendall, I, '10 (D).**
56 Oak Street, Lowell, Mass.
- Howorth, Harmon, VI, '30 (B.T.E.).**
Celanese Corporation of America, Narrows, Va.
- Hoyt, Charles William Henry, IV, '07 (D).**
Civil Engineer, Chemical Construction Corp., 30 Rockefeller Plaza, New York, N. Y.
- Hsu, Hsueh-Chang, VI, '23 (B.T.E.).**
- Hubbard, Harold Harper, I, '22 (D).**
With Columbus Manufacturing Company, 40 Worth Street, New York City.
- Hubbard, Ralph King, IV, '11 (D).**
President and Treasurer, Packard Mills, Inc., Webster, Mass.
- Huising, Geronimo Huerva, I, '08 (D).**
- Hull, Robert Barney, VI, '40 (B.T.E.).**
Textile Engineer, United States Testing Company, Inc., Hoboken, N. J.
- Hunt, Chester Lansing, III, '05 (C).**
- Hunton, John Horace, II, '11 (D).**
Supervisor, Textile Industries, Morgan Memorial Co-operative Industries and Stores, South Athol, Mass.
- Hurd, Ira Swain, IV, '29 (B.T.C.).**
Demonstrator, Rohm & Haas Co., 222 West Washington Square, Philadelphia, Pa.
- Hurtado, Leopoldo, VI, '10 (D).**
- Hurwitz, Jacob, IV, '23 (B.T.C.).**
- Hutton, Clarence, III, '03 (C).**
Advertising, Davis & Furber Machine Company, North Andover, Mass.
- Huyck, William Francis, II, '34 (D).**
Despatcher, Pratt & Whitney Aircraft, East Hartford, Conn.
- Hyman, Wolfred, II, '28 (D).**
Men's Clothier, Hyman Brothers, Boston, Mass.
- I**
- Inkpen, Norman Alfred, IV, '41 (B.T.C.).**
Textile Chemist and Colorist, Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J.
- Ireland, Wilson Gerard, VI, '36 (B.T.E.).**
Assistant to Felt Designer, F. C. Huyck & Sons, Albany, N. Y.
- Irvine, James Andrew, VI, '17 (B.T.E.).**
Personnel Director, Scott & Williams, Inc., Laconia, N. H.
- Isaacson, George Franklin, II, '26 (D).**
Salesman, Clarence S. Brown & Co., 40 Worth Street, New York City.
- Ivers, Gerald Anthony, IV, '31 (B.T.C.).**
Teacher, High School, Chelmsford, Mass.
- J**
- Jaeger, Robert William, IV, '23 (B.T.C.).**
Lubricating Department, Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Ill.
- Jarek, Helen Jane, IV, '39 (B.T.C.).**
74 Eleventh Street, Lowell, Mass.
- Jarek, Julius, IV, '31 (B.T.C.).**
74 Eleventh Street, Lowell, Mass.
- Jelleme, William Oscar, I, '10 (D).**
With Pacific Mills, 214 Church Street, New York City.
- Jen, Shang Wu, I, '21 (D).**
- Jessen, Robert Frederick, I, '36 (D).**
- Jessop, Charles Clifford, VI, '22 (B.T.E.).**
- Johnson, Arthur Kimball, IV, '13 (D).** (S.B. 1917, Massachusetts Institute of Technology.)
Chief Chemist, Neidich Process, Division of Underwood Elliot Fisher Corporation, Burlington, N. J.
- Johnson, George Henry, IV, '20 (B.T.C.).**
General Manager, American Institute of Laundering, Joliet, Ill.
- Johnson, Norman Albin, IV, '31 (B.T.C.).**
Editor, American Dyestuff Reporter, Howes Publishing Company, Inc., 440 Fourth Avenue, New York City.
- Johnson, Philip Stanley, IV, '24 (B.T.C.).**
- Johnston, Lee Gale, IV, '37 (B.T.C.).**
Research—Textile Chemist, American Institute of Laundering, Joliet, Ill.
- Jones, Bliss Morris, IV, '30 (B.T.C.).**
Sales Manager, Rodney Hunt Machine Company, Orange, Mass.
- Jones, Charles Andrews, Jr., VI, '41 (M.S.).**
(B.S. 1919, Virginia Military Institute—M.S. 1927, University of Wisconsin.)
Major, U. S. Army Quartermaster Depot, Philadelphia, Pa.
- Jones, Everett Amos, III, '05 (D).**
3 Park Place, Auburn, N. Y.
- Jones, Nathaniel Erskine, I, '21 (D).**
Textile Inspector, U. S. Army Quartermaster Depot, Philadelphia, Pa.
- Joslin, Harold Wheeler, II, '28 (D).**
Merchant, Cut Rate Store, Windsor, Vt.
- Joy, Thomas, VI, '26 (B.T.E.).**
Sales Engineer, Gulf Oil Corporation, Boston, Mass.
- Jury, Alfred Elmer, IV, '04 (D).**
Agent, Winsboro Mills, Winsboro, S. C.
- K**
- Kaatze, Julius, VI, '22 (B.T.E.).**
- Kaiser, J. Raymond, VI, '36 (B.T.E.).**
Materials Engineer, Navy Department, Bureau of Aeronautics, Washington, D. C.
- Kane, Roger Hugh, II, '38 (D).**
Assistant Superintendent, Madison Woolen Co., Madison, Me.
- Kao, Chieh-Ching, VI, '23 (B.T.E.).**
- Kaplan, Samuel Gilbert, IV, '38 (B.T.C.).**
Junior Inspector of Textiles, U. S. A. Quartermaster Depot, Philadelphia, Pa.
- Karanfilian, John Hagop, VI, '21 (B.T.E.).**
- Kay, Harry Pearson, II, '09 (D).**
Associate Member, Penn Mutual Life Insurance Company, Boston, Mass.
- Kelakos, Charles George, VI, '38 (B.T.E.).**
6 Rockdale Avenue, Lowell, Mass.
- Kelly, Warren Thomas, VI, '38 (B.T.E.).**
Textile Inspector, Quartermaster Depot, Philadelphia, Pa.
- Kendall, Charles Henry, II, '23 (D).**
Superintendent, Bridgewater Woolen Company, Bridgewater, Vt.
- Kennedy, Francis Charles, VI, '26 (B.T.E.).**
Textile Engineer, United States Rubber Company, Detroit, Mich.
- Kennedy, James Harrington, Jr., VI, '36 (B.T.E.).** '40 (M.S.).
Assistant Professor, Worsted Yarn Department, Lowell Textile Institute, Lowell, Mass.
- Kennedy, Robert Miller, VI, '38 (B.T.E.).**
With Limerick Yarn Mills, Limerick, Me.
- Kenney, Frederick Leo, II, '27 (D).**
Mill Superintendent, Uxbridge Worsted Company, Pascoag, R. I.
- Kent, Clarence LeBaron, III, '06 (C).**
Salesman, Socony Vacuum Oil Company, South Portland, Me.
- Keough, Wesley Lincoln, II, '10 (D).**
Clerk of Police Court, Pasadena, Calif.
- Kidder, Glen Mortimer, IV, '34 (B.T.C.).**
Textile Chemist and Laboratory Supervisor, The Lux Laboratories (Lever Bros. Co.), Cambridge, Mass.
- Kiernan, James Vincent, VI, '40 (B.T.E.).**
Draught, Mass.
- Killheffer, John Vincent, IV, '28 (B.T.C.).**
Laboratory Manager, E. I. du Pont de Nemours & Co., Inc., Dyestuffs Division, Charlotte, N. C.
- Kilmartin, John Joseph, I, '31 (D).**
Department of Public Health, Lowell, Mass.
- King, Daniel Joseph, IV, '32 (B.T.C.).**
With American Hide & Leather Co., Lowell, Mass.
- Klosowicz, Edward Joseph, VI, '38 (B.T.E.).**
Assistant Secretary & Assistant Superintendent, Hartford Spinning, Inc., Unionville, Conn.

- Knight, Richard Greene Howland, Jr., VI, '38 (B.T.E.).**
Mill Engineer, Berkshire Fine Spinning Associates, Inc., Providence, R. I.
- Knowland, Daniel Power, IV, '07 (D).**
Chief Chemist, Geigy Company, Inc., 89 Barclay Street, New York City.
- Knox, Joseph Carleton, VI, '23 (B.T.E.). (S.M. 1937, Harvard University.)**
Assistant Sanitary Engineer, Massachusetts Department of Public Health, Boston, Mass.
- Kokoska, Michael George, VI, '33 (B.T.E.).**
- Kolsky, Samuel Irving, IV, '30 (B.T.C.).**
Manager, Kolsky Jewelry Co., Lawrence, Mass.
- Kopatch, Chester Marion, IV, '35 (B.T.C.).**
Dyestuff Salesman, Ciba Company, Boston, Mass.
- Koroskys, Michael Joseph, II, '41 (D).**
In Charge of Wool Preparation, Drycor Felt Co., Belleville, N. J.
- Kostopoulos, Emanuel Arthur, VI, '30 (B.T.E.).**
Assistant Technologist, War Department, Quartermaster's Depot, Philadelphia, Pa.
- Koulas, Stanley Charles, IV, '41 (B.T.C.).**
Chemist and Assistant Dyer, Phoenix Dye Works, Chicago, Ill.
- Krishnan, Maharaj, VI, '30 (B.T.E.).**
Montgomery, India.
- Kuo, Limao, VI, '26 (B.T.E.).**
In charge of Quality Testing Division, Shanghai Bureau of Inspection and Testing of Commercial Commodities, Shanghai, China.

L

- Lamb, Arthur Franklin, II, '10 (D).**
In business, Cleansing and Dyeing, Lamb's Cleaning, Rockland, Maine.
- Lamont, Robert Laurence, II, '12 (D).**
Secretary, L. F. Grammes & Sons, Inc., Allentown, Pa.
- Lamprey, Leslie Balch, IV, '16 (B.T.D.).**
Lawrence Post Office, Lawrence, Mass.
- Lamson, George Francis, I, '00 (D).**
With Riley Stoker Corporation, Worcester, Mass.
- Landfield, Harold, IV, '41 (B.T.C.).**
War Department, Inspector of Chemical Warfare Materials, Boston Chemical Warfare Procurement District, Boston, Mass.
- Lane, John William, I, '06 (C).**
- Lane, Joseph James, 2nd, VI, '41 (B.T.E.).**
U. S. Army.
- Lane, Mrs. Joseph J., 2nd (Woodard, Alice M.) VI, '41 (B.T.E.).**
Chelmsford, Mass.
- Lane, Oliver Fellows, IV, '15 (B.T.D.).**
Technical Service, Sales Department, Krebs Pigment and Color Corp., Newark, N. J.
- Lanner, Arthur William, IV, '40 (B.T.C.).**
Textile Chemist, Naval Clothing Depot, Brooklyn, N. Y.
- Larratt, John Francis, II, '22 (D).**
Gift Studio, Studio 5, El Pasco, Santa Barbara, Calif.
- Lauder, Robert William, VI, '35 (B.T.E.).**
Abbot Worsted Company, Forge Village, Mass.
- Laughlin, James Knowlton, III, '09 (D).**
- Laurin, Eric Thurston Lawrence, IV, '21 (B.T.C.).**
Director of Textile Service, Calgon, Inc., 300 Ross Street, Pittsburgh, Pa.
- Laurin, Sven Albert, IV, '23 (B.T.C.).**
Minister, Tenney Memorial Church, Salem, N. H.
- Lawson, Russell Monroe, VI, '34 (B.T.E.).**
Inspector of Textiles, War Department, Quartermaster Depot, Philadelphia, Pa.
- Leavitt, George Herbert, II, '26 (D).**
Night Assistant Superintendent, F. C. Huyck & Sons, Albany, N. Y.
- Leblanc, Gerald Alderic, VI, '34 (B.T.E.).**
With Lowell Furniture Company, Lowell, Mass.
- Lee, Shao-fong, VI, '36 (B.T.E.).**
- Lee, William Henry, II, '05 (C).**
Treasurer, John H. Lee & Son, Holyoke, Mass.
- Lehto, Reino Gust, III, '38 (D).**
24 Waltham Street, Maynard, Mass.
- Leitch, Harold Watson, IV, '14 (B.T.D.).**
General Superintendent, Pacific Mills, Worsted Division, Lawrence, Mass.
- Lemieux, Robert Alphonse, IV, '38 (B.T.C.).**
Textile Chemist, Penick & Ford, Ltd., Inc., 420 Lexington Avenue, New York City.
- Lemire, Joseph Emile, VI, '21 (B.T.E.).**
Teacher of Mathematics, Lowell High School, Lowell, Mass.
- Leonard, Leo Edward, I, '27 (D).**
- Leslie, Kenneth Everett, IV, '35 (B.T.C.).**
Assistant to Sales Manager, Ciba Company, Inc., 627 Greenwich Street, New York, N. Y.
- Levin, Samuel, IV, '39 (B.T.C.).**
Director of Dyeing, Spevack and Garbaccio, Inc., East Rutherford, N. J.
- Lewis, Dorothy Elaine, VI, '41 (B.T.E.).**
Buyer (fabrics), U. S. Rubber Co., Naugatuck, Conn.
- Lewis, George Kenneth, VI, '24 (B.T.E.).**
Divisional Sales Manager, Sonoco Products Company, Mystic, Conn.
- Lewis, LeRoy Clark, IV, '08 (D).**
112 Kingston Avenue, Hawthorne, N. J.
- Lewis, Walter Scott, IV, '05 (D).**
Cotton Technologist, Bureau of Chemistry and Engineering, Southern Regional Research Laboratory, U. S. Department of Agriculture, New Orleans, La.
- Lifland, Abraham, IV, '31 (B.T.C.).**
- Lifland, Bessie, IV, '32 (B.T.C.).**
See Appel, Mrs. Bessie L.
- Lifland, Morris, VI, '33 (B.T.E.).**
- Lillis, Marvin Hale, IV, '14 (D).**
40 Lawrence Street, Lawrence, Mass.
- Lincoln, Charles Ernest, IV, '37 (B.T.C.).**
Superintendent, Collins & Aikman Corporation, Manayunk, Philadelphia, Pa.
- Linden, Leo, VI, '41 (B.T.E.).**
Laboratory Division, Warwick Mills, Boston, Mass.
- Lindsy, Walter Coburn, IV, '29 (B.T.C.).**
Chemist, Sidney Blumenthal & Co., Inc., Rocky Mount, N. C.
- Linsey, Edward, II, '25 (D).**
- Little, Ralph Harding, II, '39 (D).**
Assistant Designer, M. T. Stevens & Sons, Fence Dale, R. I.
- Littlefield, Carl Richard, VI, '38 (B.T.E.).**
With Asbestos Textile Company, North Brookfield, Mass.
- Lizak, Boleck Louis, IV, '40 (M.S.).**
(B.S., Lewis Institute, 1937.) Textile Chemist and Dyer, Morgan Dyeing & Bleaching Co., Rochelle, Ill.
- Logan, George Leslie, VI, '28 (B.T.E.).**
Sales Representative, Veeder-Root, Inc., Hartford, Conn.
- Lokur, Swamirao Ramrao, IV, '35 (B.T.C.).**
With Lolana Textile Industries, Thalakkwadi, Belgaum, India.
- Lombard, Carleton Joshua, VI, '23 (B.T.E.).**
Vice-President, Riggs & Lombard, Textile Machinery, Lowell, Mass.
- Loney, Robert William, II, '22 (D).**
587 Union Street, Manchester, N. H.
- Longbottom, Parker Wyman, IV, '21 (B.T.C.).**
Dyer, Claremont Waste Manufacturing Company, Claremont, N. H.
- Loveless, Everton Hanscom, VI, '31 (B.T.E.).**
With American Viscose Corporation, Marcus Hook, Pa.
- Lowe, John Charles, VI, '34 (B.T.E.), '40 (M.S.).**
Assistant Professor, Department of Worsted Yarns, Lowell Textile Institute, Lowell, Mass.
- Lowe, Philip Russell, VI, '24 (B.T.E.).**
Adjuster, Factory Mutual Fire Insurance Company, Charlotte, N. C.
- Lucey, Edmund Ambrose, II, '04 (D).**
Partner Lucey Knitwear Company and Consulting Engineer, 15 East 26th Street, New York City and Manchester, Conn.
- Lussier, Joseph Adrien, II, '27 (D).**
Staff Superintendent, Hood Rubber Company, Inc., Watertown, Mass.
- Lutz, Helmuth Erich, IV, '38 (B.T.C.).**
7 Houghton Street, Lowell, Mass.
- Lyle, Robert Keith, IV, '37 (B.T.C.).**
Textile Inspector, Quartermaster Depot, Jeffersonville, Ind.

Lynch, Edward Mark, IV, '40 (B.T.C.).
Chemical Technologist, The Derby Company,
Lawrence, Mass.

M

McAllister, Gordon Algeo, IV, '31 (B.T.C.).
Fieldman, Middlesex County Agricultural
Conservation Association, Concord, Mass.

**McBee, Mrs. Damon F. (Warren, E. Mabelle),
IV, '28 (B.T.C.).**

Chemist, Warwick Mills, Laboratory Division,
Boston, Mass.

McCann, John Joseph, Jr., VI, '24 (B.T.E.).
Textile Machine Designer, The McCann Com-
pany, River Works, Andover, Mass.

McCool, Frank Leslie, IV, '10 (D).
Resident Manager, Sandoz Chemical Works,
Inc., Providence, R. I.

Macdonald, Hector Graham, IV, '19 (B.T.C.).
Assistant Manager, Franklin Process Company,
Providence, R. I.

McDonald, Gerald Francis, IV, '30 (B.T.C.).
Plant Chemist and Dyer, Merrimack Hat Cor-
poration, Amesbury, Mass.

McDonald, John Joseph, IV, '32 (B.T.C.).
Teacher of Testing and Dyeing, Textile High
School, New York, N. Y.

McDonnell, William Henry, I, '06 (C).
Lawyer-Judge, McDonnell & White, 40 Court
Street, Boston, Mass.

McDougall, Francis Gerard, VI, '32 (B.T.E.).
U. S. Postal Department, Lowell, Mass.

McGee, Francis Patrick, IV, '30 (B.T.C.).
Teacher, Lowell High School, Lowell, Mass.

McGilly, John Seede, VI, '40 (B.T.E.).
Assistant in Merchandising, Real Silk Hosiery
Mills, Inc., Indianapolis, Ind.

McGowan, Henry Earl, VI, '22 (B.T.E.).
(Ed.M., 1938, Boston University).

Major, U. S. Army, Fort Eustis, Va.

McGuire, Edward Perkins, VI, '28 (B.T.E.).
Divisional Manager, Montgomery Ward, 75
Varick Street, New York City.

MacKay, Stewart, III, '07 (D).
Assistant Professor of Textile Design, Lowell
Textile Institute, Lowell, Mass.

McKay, Benedict Josephus, IV, '28 (B.T.C.).
Stoughton, Mass.

McKenna, Hugh Francis, IV, '05 (D).
Salesman, American Aniline Products, 820
South Clinton Street, Chicago, Ill.

McKinnon, Norman, VI, '29 (B.T.E.).
Weaving Foreman, Shelton Looms, Shelton,
Conn.

McKinstry, James Bradley, II, '25 (D).
Agent and Superintendent, H. T. Hayward
Company, Franklin, Mass.

**McKittrick, Raymond Wellington, VI, '28
(B.T.E.).**
Vice-President, Frank G. McKittrick Co.,
Lowell, Mass.

McLean, Earle Raymond, IV, '30 (B.T.C.).
Industrial Fellow, Mellon Institute of Indus-
trial Research, Pittsburgh, Pa.

MacPherson, Wallace Angus, III, '04 (D).
Designer, Wuskanut Mills, Inc., Farnumville,
Mass.

McQuade, Allan John, VI, '36 (B.T.E.).
Textile Inspector, Jeffersonville Quartermaster
Depot, Jeffersonville, Ind.

McQuaid, Barton Mathewman, IV, '32 (B.T.C.).
Billerica, Mass.

McTeague, George David, IV, '41 (B.T.C.).
Assistant Finisher, Great Barrington Mfg. Co.,
Great Barrington, Mass.

Macher, Henry, II, '23 (D).
Secretary, Central Importing Company, Inc.,
of New Jersey, Passaic, N. J.

Mackie, Chauncey Jacob, II, '40 (D).
U. S. Army.

Macktey, Lester Allen, II, '41 (D).
Textile Inspector, U. S. Government, Webster,
Mass.

Maguire, James Joseph, II, '28 (D).
Designer, Uxbridge Worsted Company, Ux-
bridge, Mass.

Maier, Margaret Mary, IV, '31 (B.T.C.).
872 Central Street, Lowell, Mass.

Mahoney, Francis Vincent, Jr., IV, '41 (B.T.C.).
Assistant Dyer, National Aniline Division, Al-
lied Chemical & Dye Corp., Buffalo, N. Y.

Mahoney, George Stephen, VI, '22 (B.T.E.).
Superintendent, Franklin Cotton Mill Com-
pany, Cincinnati, Ohio.

Mahoney, Joseph Healey, IV, '38 (B.T.C.).
Inspector, Quartermaster Depot, Jefferson-
ville, Ind.

Mailey, Howard Twisden, II, '08 (D).
Manufacturing Superintendent, Worsted Dis-
tribution, Pacific Mills, Lawrence, Mass.

Manderbach, Harold Mills, VI, '37 (M.S.).
(B.A. 1924, University of Michigan.)

Lieutenant Colonel, U. S. Army Quar-
termaster's Depot, Philadelphia, Pa.

Manning, Frederick David, IV, '40 (D).
Industrial Engineer, General Cable Corpora-
tion, 420 Lexington Avenue, New York City.

Manning, Neil Joseph, IV, '41 (B.T.C.).
With Pacific Mills, Lawrence, Mass.

Marinel, Walter Newton, I, '01 (D).
Engineer and Auto Mechanic, Morris Brothers,
North Chelmsford, Mass.

Mark, Aris Sawa, VI, '22 (B.T.E.).
Sales Department, Franklin Manufacturing
Company, Inc., 40 Worth Street, New York
City.

Markarian, Haig, IV, '33 (B.T.C.).
Dye House, Arlington Mills, Lawrence, Mass.

Markarian, Moushy, IV, '36 (B.T.C.).
Chemist, Arnold Print Works, North Adams,
Mass.

Marsden, Sidney Robert, IV, '39 (B.T.C.).
Salesman, The Spool Cotton Co., Pawtucket,
R. I.

Martin, Harry Warren, IV, '11 (D).
Manager of Footwear, Hood Rubber Company,
Inc., Watertown, Mass.

Maslanka, Edward John Felix, IV, '40 (B.T.C.).
Ensign, U. S. Naval Reserve, U.S.S. Wash-
ington.

Mason, Archibald Lee, VI, '09 (D).
Concord Road, Billerica, Mass.

Mason, Frederick Rufus, VI, '41 (B.T.E.).
Inspector, Kendall Finishing Co., Walpole,
Mass.

Mason, Philip Edwin, IV, '26 (B.T.C.).
Chief Chemist, Watson Park Company, Bal-
lardvale, Mass.

Mather, Harold Thomas, VI, '13 (D).
Inspector, Associated Factory Mutual Fire
Insurance Companies, Boston, Mass.

Mathieu, Alfred Jules, II, '20 (D).
Salesman, Dyeing and Combining, French
Worsted Company, Woonsocket, R. I.

Matthews, Elmer Clark, II, '17 (D).
Treasurer and General Manager, Thermo Mills,
Inc., Hudson, N. Y.

Matthews, Raymond Lewis, IV, '34 (B.T.C.).
Overseer of Dyeing, Crompton Shenandoah
Company, Waynesboro, Va.

Matthews, Robert Jackson, VI, '29 (B.T.E.).
Sales, Pacific Mills, 261 Fifth Avenue, New
York City.

**Mauersberger, Herbert Richard Carl, III, '18
(D).**

Technical Editor and Consultant, Rayon
Textile Monthly, 303 Fifth Avenue, New York
City.

Mazer, Samuel, IV, '26 (B.T.C.).
In business, Dyer and Converter of Yarns, S.
Mazer & Co., Allston, Mass.

Meadows, William Ransom, I, '04 (D).
Cotton Registrar, Chicago Board of Trade,
Chicago, Ill.

Meehan, John Joseph, IV, '32 (B.T.C.).
Textile Colorist, Warwick Print Works, Bound
Brook, N. J.

Meek, Lotta, IIIB, '07 (C).
See Parker, Mrs. Herbert L.

Meeker, Samuel, IV, '27 (B.T.C.).
Chemist, Aridye Corporation, Fairlawn, N. J.

Megas, Charles, IV, '37 (B.T.C.).
Inspector of Textiles, War Department, Quar-
termaster Depot, Philadelphia, Pa.

Meinelt, Herbert Eugene, IV, '32 (B.T.C.).
Dyer, with Lorraine Manufacturing Company,
Pawtucket, R. I.

- Mejia, Eduardo, B.S., I, '40 (D).
Medellin, Colombia, S. A.
- Merchant, Edith Clara, IIb, '00 (C).
Art Supervisor, Public Schools, Lowell, Mass.
- Merrill, Allan Blanchard, IV, '11 (D).
Technical Superintendent, B. F. Goodrich Company, Akron, Ohio.
- Merrill, Gilbert Roscoe, VI, '19 (B.T.E.).
Professor of Textiles; in charge of Cotton Yarn Department, Lowell Textile Institute, Lowell, Mass.
- Merrill, John Leslie, VI, '27 (B.T.E.).
Instructor in Weaving, Lowell Textile Institute, Lowell, Mass.
- Merritt, Charles Adelbert, II, '39 (D).
Assistant Designer, Knox Woolen Company, Camden, Me.
- Meyers, Chester William, IV, '27 (B.T.C.).
Dyer, Massachusetts Knitting Mills, Jamaica Plain, Mass.
- Midwood, Arnold Joseph, IV, '05 (D).
Salesman, E. I. du Pont de Nemours & Co., 140 Federal Street, Boston, Mass.
- Milberg, Maurice, VI, '41 (B.T.E.).
Plant Supervisor, Monterey Undergarment Co., Inc., East Newark, N. J.
- Miller, Arnold Irving, IV, '39 (B.T.C.).
Junior Inspector of Textiles, U. S. A. Quartermaster Corps, Philadelphia, Pa.
- Miller, Joshua, VI, '24 (B.T.E.).
Material Engineer, Naval Aircraft Factory, Navy Yard, Philadelphia, Pa.
- Minge, Jackson Chadwick, I, '01 (C).
- Mintz, Irving Paul, IV, '41 (B.T.C.).
Foreman, Eureka Printing Co., Clifton, N. J.
- Mirsky, Leon Robert, II, '19 (D).
229 West 97th Street, New York City.
- Mitchell, Charles Alvah, II, '24 (D).
- Moller, Ernest Arthur, II, '22 (D).
Fuel Tank Division, National Defense, The Goodyear Tire & Rubber Co., Inc., Akron, Ohio.
- Molloy, Francis Henry, II, '16 (D).
Salesman, F. C. Huyck & Sons, Room 3320, Empire State Building, New York City.
- Monahan, Harold Joseph, IV, '39 (B.T.C.).
U. S. Army, Camp Edwards.
- Moody, Leon Eugene, IV, '34 (B.T.C.).
Superintendent, U. S. Finishing Company, Sterling, Conn.
- Moore, Edward Francis, II, '25 (D).
Superintendent, The Adler Company, Cincinnati, Ohio.
- Moore, Everett Byron, I, '05 (D).
With Bridgeport Coach Lane Company, Bridgeport, Conn.
- Moore, William Joseph, IV, '21 (B.T.C.).
Colorist, Pacific Mills, Lawrence, Mass.
- Moorehouse, William Roy, IV, '01 (D).
50 Commonwealth Avenue, Boston, Mass. Retired—on call by National Aniline Division, Allied Chemical & Dye Corp., Boston, Mass.
- Moran, Edward Francis, IV, '32 (B.T.C.).
Assistant Dyer, Hub Hosiery Mills, Lowell, Mass.
- Moreno, Emilio Gomez, Jr., VI, '36 (B.T.E.).
Draftsman, Whitin Machine Works, Whitinsville, Mass.
- Morrill, Howard Andrew, VI, '16 (D).
- Morris, Merrill George, IV, '21 (B.T.C.).
Chemist, National Aniline Division, Allied Chemical & Dye Corp., 357 West Erie Street, Chicago, Ill.
- Morrison, Haven Asa, IV, '25 (B.T.C.).
Salesman, Ciba Company, Inc., Boston, Mass.
- Morrison, Roland Charles, IV, '34 (B.T.C.).
Salesman, Calco Chemical Division, American Cyanamid Company, Boston, Mass.
- Morse, Judson Pickering, II, '33 (D).
36 Birch Street, Marblehead, Mass.
- Mullaney, John Francis, VI, '20 (B.T.E.).
Maintenance Superintendent, Lawrence Print Works, Inc., Lawrence, Mass.
- Mullen, Arthur Thomas, II, '09 (D).
Industrial Manager, Commonwealth of Massachusetts, West Concord, Mass.
- Munroe, Sydney Philip, I, '12 (D).
Cost Executive, Wellington Sears Company, New York, N. Y.
- Murphy, Francis Arthur, IV, '41 (B.T.C.).
Textile Chemist, National Starch Products, Inc., 820 Greenwich Street, New York, N. Y.
- Murphy, Hubert James, IV, '39 (B.T.C.).
U. S. Inspector, Quartermaster Depot, Jeffersonville, Ind.
- Murphy, John Joseph, IV, '33 (B.T.C.).
Assistant Chemist, Bates Manufacturing Company, Lewiston, Me.
- Murray, James, IV, '13 (D).
Chemist and Superintendent, Martin Cantine Company, Saugerties, N. Y.
- Murray, James Andrew, II, '10 (D).
Analyst, Massachusetts Unemployment Compensation Commission, Boston, Mass.
- Myers, Walter Flemings, VI, '29 (B.T.E.).
Branch Salesman, Atlantic Register Company, Waltham, Mass.

N

- Nary, James Anthony, II, '22 (D).
Manager, United States Testing Company, Inc., Chicago, Ill.
- Natsios, Basil Andrew, IV, '37 (B.T.C.).
Inspector, Quartermaster Depot, Jeffersonville, Ind.
- Nelson, Roy Clayton, II, '21 (C).
Resident Manager, Assabet Mills, Maynard, Mass.
- Nelson, Russell Sprague, VI, '22 (B.T.E.).
With Draper Corporation, Hopedale, Mass.
- Nelson, William Arthur, IV, '40 (B.T.C.).
Inspector of Textiles, War Department, Quartermaster Depot, Jeffersonville, Ind.
- Nerney, Francis Xavier, IV, '37 (B.T.C.).
Textile Chemist, Becco Sales Corp., Buffalo, N. Y.
- Neugroschl, Sigmund Israel, I, '21 (D).
- Newall, J. Douglas, IV, '09 (D).
Agent, Boston Duck Company and Bondsville Bleachery & Dye Works, Bondsville, Mass.
- Newcomb, Guy Houghton, IV, '06 (C).
Manager, Philadelphia Dye Sales, E. I. du Pont de Nemours & Co., 1616 Walnut Street, Philadelphia, Pa.
- Neyman, Julius Ellis, IV, '15 (B.T.D.).
Furniture Dealer, Neyman Furniture Company, 193-199 Middlesex Street, Lowell, Mass.
- Nichols, Raymond Elmore, VI, '10 (D).
522 Pine St., Lowell, Mass.
- Niven, Robert Scott, VI, '12 (D).
Drafting Department, General Electric Company, Lynn, Mass.
- Nostrand, Mrs. William L. (Conklin, Jennie Grace), IIb, '05 (C).
- Nuttall, Andrew Frederick, IV, '40 (B.T.C.).
Dye House, Merrimack Manufacturing Company, Lowell, Mass.

O

- O'Brien, Philip Francis, II, '15 (D). (B.S. New York University, M.A. Fordham University.)
Chairman, Textile Department, Textile High School, New York City.
- Ocoma, Estanislao Manaois, B.S., VI, '39 (B.T.E.).
Textile Engineer, National Development Company Textile Mills, Manila, P. I.
- O'Connell, Clarence Edward, IV, '11 (D).
Dyer, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- O'Connor, Lawrence Dennis, VI, '17 (D).
With Beggs & Cobb, Winchester, Mass.
- O'Donnell, John Delaney, I, '04 (C).
- O'Donoghue, Eileen Margaret, VI, '39 (B.T.E.).
See Chapman, Mrs. Boyd P., Jr.
- O'Hara, William Francis, IV, '04 (C).
Chemist, Original Bradford Soap Works, West Warwick, R. I.
- Okun, Seymour, VI, '41 (B.T.E.).
Research Laboratory, J. P. Stevens & Co., 44 Leonard Street, New York, N. Y.
- Olsen, Earl Edward, VI, '38 (B.T.E.).
With Columbia Rope Company, Auburn, N. Y.
- Olsen, Herbert Charles, IV, '39 (B.T.C.).
U. S. Army.

- Olson, Carl Oscar, II, '24 (D).**
Proprietor, Budget Beauty Salon, Hartford, Conn.
- Orlauski, Anthony, IV, '32 (B.T.C.).**
Dyer, Bradford Dyeing Association, Bradford, R. I.
- Orr, Andrew Stewart, IV, '22 (B.T.C.).**
Manager, Storey & Co., Brockton, Mass.
- Osborne, George Gordon, VI, '28 (B.T.E.).**
(M.Sc. 1932, North Carolina State College.)
With Wellington, Sears Company, Boston, Mass.
- Othote, Louis Joseph, I, '23 (D).**
Sales and merchandising, J. W. Valentine Co., Inc., 40 Worth Street, New York City.

P

- Paige, Walter Hale, Jr., VI, '38 (B.T.E.).**
Paul Whitin Manufacturing Company, Northbridge, Mass.
- Palais, Samuel, IV, '18 (B.T.C.).**
With Worcester Knitting Company, Worcester, Mass.
- Parechanian, James Humphrey, IV, '35 (B.T.C.), '38 (M.S.).**
- Parigian, Harold Hrant, IV, '28 (B.T.C.).**
- Parker, Everett Nichols, I, '05 (D).**
President, Parker Spool and Bobbin Company, 27-53 Middle Street, Lewiston, Maine
- Parker, Mrs. Herbert L. (Meek, Lotta L.), IIb, '07 (C).**
- Parker, Hubert Frederic, VI, '20 (B.T.E.).**
Mill Engineer, Castanea Paper Company, Lock Haven, Pa.
- Parker, John George, Jr., IV, '31 (B.T.C.).**
Assistant Superintendent, Stanley Woolen Company, Uxbridge, Mass.
- Parkin, Robert Wilson, VI, '27 (B.T.E.).**
Superintendent, Limerick Yarn Mills, Limerick, Me.
- Parkis, William Lawton, I, '09 (D).**
President and General Manager, Connecticut Cordage Company, North Oxford, Mass.
- Parsons, Charles Sumner, VI, '27 (B.T.E.).**
Superintendent, Hathaway Manufacturing Company, New Bedford, Mass.
- Patrick, Stephen Edmund, Jr., I, '41 (D).**
With Saco-Lowell Shops, Biddeford, Maine.
- Patsourakos, James Peter, IV, '39 (B.T.C.).**
With Pacific Mills, Lawrence, Mass.
- Peabody, Roger Merrill, II, '16 (D).**
With Seovill Manufacturing Company, Waterbury, Conn.
- Pearlstein, Maxwell, III, '28 (D).**
Proprietor, Abbottsford Pharmacy, Roxbury, Mass.
- Pearson, Alfred Henry, IV, '11 (D).**
Salesman, Ciba Company, Inc., 157 Federal Street, Boston, Mass.
- Peary, John Ervin, III, '31 (D).**
Box 109, Dryden, Me.
- Pease, Chester Chapin, I, '09 (D).**
With Jackson Mills, Nashua, N. H.
- Pease, Kilburn Gray, I, '38 (D).**
With Jackson Mills, Nashua, N. H.
- Peck, Carroll Wilmot, IV, '13 (D).**
Vice-President, George Mann & Co., Inc., Providence, R. I.
- Pelt, Joseph Paul, Jr., VI, '40 (B.T.E.).**
660 Sinclair Terrace, South Orange, N. J.
- Penney, Cabot William, III, '33 (D).**
Assistant Designer, Wyandotte Worsted Company, Pittsfield, Mass.
- Perkins, John Edward, III, '00 (D).**
24 Abbott Street, Pittsfield, Mass.
- Perkins, J. Dean, III, '08 (D).**
Superintendent, Arms Textile Manufacturing Company, Manchester, N. H.
- Perlman, Samuel, IV, '17 (B.T.C.). (LL.B. 1927, New Jersey Law School.)**
Consulting Textile Chemist-Lawyer, 585 Main Avenue, Passaic, N. J.
- Perlmutter, Barney Harold, IV, '23 (B.T.C.).**
Treasurer, Mallon Mattress Company, Boston, Mass.
- Pernick, David, VI, '41 (B.T.E.).**
Night Foreman of Machine Division, Joseph Pernick Co., Maspeth, L. I., N. Y.
- Pero, Henry Leland, VI, '41 (B.T.E.).**
With Warren Woolen Co., Stafford Springs, Conn.
- Pero, Richard Omer, II, '31 (D).**
Assistant Superintendent, Amos Abbott Company, Dexter, Me.
- Peterson, Eric Arthur, IV, '31 (B.T.C.).**
Chelmsford, Mass.
- Petty, George Edward, I, '03 (C).**
Real Estate, 211 Ashe Street, Greensboro, N.C.
- Phaneuf, Maurice Philippe, III, '20 (D).**
Accountant, Librarie St. Michel, Inc., Boston, Mass.
- Phelan, Bernard Michael, IV, '29 (B.T.C.).**
Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., 351 Abbott Road, Buffalo, N. Y.
- Phelan, Leonard John, IV, '35 (B.T.C.).**
Textile Colorist, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
- Phillips, Maurice Gordon, VI, '41 (B.T.E.).**
With Dodge-Davis Mfg. Co., Bristol, N. H.
- Pierce, George Whitwell, IV, '25 (B.T.C.).**
Superintendent of Dyeing and Finishing, Kramer Hosiery Company, Nazareth, Pa., and Queen City Textile Corporation, Allentown, Pa.
- Piligian, Hsiag Nishan, IV, '32 (B.T.C.).**
Inspector of Textiles, Quartermaster Depot, U. S. Army, Philadelphia, Pa.
- Pillsbury, Ray Charles, I, '13 (D).**
Sales Agent, Universal Winding Company, Providence, R. I.
- Pizzuto, Joseph James, Jr., IV, '33 (B.T.C.).**
Teacher, Textile High School, New York, N. Y.
- Plaisted, Webster E., II, '18 (D).**
Superintendent of Woollens, Pacific Mills, Worsted Division, Lawrence, Mass.
- Platt, Walter Wallace, IV, '41 (B.T.C.).**
Graduate Student, Lowell Textile Institute, Lowell, Mass.
- Ploubides, John Peter, IV, '38 (B.T.C.).**
Colorist, Pacific Mills, Worsted Division, Lawrence, Mass.
- Plovnick, Max David, IV, '35 (B.T.C.).**
Textile Chemist, Southern Asbestos Company, Charlotte, N. C.
- Poremba, Leo Louis, IV, '35 (B.T.C.).**
Assistant Overseer, Dyehouse, Elm Woolen Mills, Tilton, N. H.
- Portilla, Jose Luis, VI, '41 (B.T.E.).**
Anahuac Sociedad Anonima, Mexico City, Mexico.
- Potter, Carl Howard, I, '09 (D).**
Sales Agent for Mills, 100 Worth Street, New York City.
- Pottinger, James Gilbert, II, '12 (D).**
President and Treasurer, Everlastik, Inc., 181 Spencer Avenue, Chelsea, Mass.
- Powers, Walter Wellington, IV, '20 (B.T.C.).**
- Pradel, Alois Joseph, III, '00 (D).**
Designer, Killingly Worsted Company, Danielson, Conn.
- Pradel, Mrs. Alois J. (Walker, Anna G.), IIb, '03 (C).**
78 Broad Street, Danielson, Conn.
- Precourt, Joseph Octave, VI, '21 (B.T.E.).**
Cotton Yarn Salesman, January & Wood Co., 222 West Adams Street, Chicago, Ill.
- Prescott, Walker Flanders, IV, '09 (D).**
Manager, Prescott & Co., Reg'd, 774 Saint Paul Street, West, Montreal, Can.
- Prescott, William Benjamin, IV, '39 (B.T.C.).**
Chemist, U. S. Army, Army Medical School, Washington, D. C.
- Preston, Harold Lawrence, VI, '30 (B.T.E.).**
Sales Engineer, Chester C. Stewart Company, 8 Beacon Street, Boston, Mass.
- Prien, Walter Ferdinand, Lt. (SC) U.S.N., VI, '39 (M.S.). (B.S., U. S. Naval Academy, 1930.)**
Supply Officer, U.S.S. Indianapolis, Care of Fleet Post Office, Navy Yard, Pearl Harbor, T. H.
- Pullafico, Salvatore Joseph, IV, '41 (B.T.C.).**
Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
- Putnam, George Ives, IV, '16 (B.T.D.).**
- Putnam, Leverett Nelson, IV, '10 (D).**
Overseer of Dyeing, Pacific Mills, Worsted Division, Lawrence, Mass.

Putnam, Philip Clayton, IV, '13 (D).
 Overseer of Dyeing, Apponaug Company,
 Apponaug, R. I.

Q

Qualey, Francis Joseph, IV, '38 (B.T.C.).
 Installer-Repairman, New England Telephone
 & Telegraph Company, Lowell, Mass.
Quigley, Gerald Francis, IV, '31 (B.T.C.).
 Boss Dyer, Hampton Co., Easthampton, Mass.
Quinlan, William Harold, VI, '20 (B.T.E.).
 171 Highland Street, Worcester, Mass.

R

Radford, Garland, II, '20 (D).
 Vice-President, Oriental Textile Mills, Hous-
 ton, Texas.
Ramsdell, Theodore Ellis, I, '02 (D).
 President, Monument Mills, Housatonic, Mass.
Rashkin, Bernard, VI, '41 (B.T.E.).
 Time Study and Methods, Maidenform Bras-
 siere Co., Bayonne, N. J.
Rawlinson, Richard William, VI, '31 (B.T.E.).
 Defense Contract Dept., Whitin Machine
 Works, Whitinsville, Mass.
Ray, Lloyd Sanford, IV, '30 (B.T.C.).
 Chemist and Electro Plater, Excelsior Hard-
 ware Company, Stamford, Conn.
Raymond, Charles Abel, IV, '07 (D).
 Silviculturist, Essex, Mass.
Recher, Theodore, VI, '33 (B.T.E.).
 Owner, The Reclin Corporation, Milford,
 Mass.
Redding, Leslie Capron, II, '26 (D).
 Designer, Waucantuck Mills, Uxbridge, Mass.
Reddish, Charles Warren, IV, '38 (B.T.C.).
 With City Dye Works, Springfield, Mass.
Reddish, Warren Thomas, Jr., IV, '39 (B.T.C.).
 Proprietor, City Dye Works, Inc., 1159 State
 Street, Springfield, Mass.
Redmond, James Reynolds, IV, '36 (B.T.C.).
 Textile Research & Development, U. S. Quar-
 termaster Corps, Jeffersonville, Ind.
Reed, Everett Carlton, VI, '39 (B.T.E.).
 Efficiency Rate Setting Work, Albany Felt
 Company, Albany, N. Y.
Reed, Harold Ernest, VI, '37 (B.T.E.).
 Assistant Technical Editor, *Textile World*, New
 York, N. Y.
Reed, Norman Bagnell, I, '10 (D).
 President & Treasurer, Surgical Products, Inc.,
 Lowell, Mass.
Reed, William Thorncroft, VI, '39 (B.T.E.).
 Warp Knitting, Whitin Machine Works,
 Whitinsville, Mass.
Rees, Richard Holmes, I, '40 (D).
 Working Foreman, Charlton Woolen Company,
 Charlton City, Mass.
Regan, Paul William, IV, '37 (B.T.C.).
 Dyer, Crompton-Shenandoah Company,
 Waynesboro, Va.
Reinhold, Kurt Herman, VI, '28 (B.T.E.).
 354 East Broadway, Fulton, N. Y.
Reynolds, Fred Bartlett, II, '08 (D).
 Purchasing Agent, M. T. Stevens & Sons Com-
 pany, North Andover, Mass.
Reynolds, Isabel Halliday, III, '03 (C).
 Clerk, Pacific Mills Print Works, Lawrence,
 Mass.
Reynolds, Raymond, II, '24 (D).
Rice, Josiah Alfred, Jr., III, '20 (D).
 Merchandise Manager, Marshall Field & Co.,
 200 Madison Avenue, New York, N. Y.
Rice, Kenneth Earl, VI, '29 (B.T.E.).
 With Sidney Blumenthal & Co., Shelton, Conn.
Rich, Charlotte Merline, IV, '41 (B.T.C.).
 Chemist, Wm. Filene's Sons Co., Boston, Mass.
Rich, Edward, IV, '15 (B.T.D.).
Rich, Everett Blaine, III, '11 (D).
 "Onacove," Sewall Road, Wolfeboro, N. H.
Rich, Milton Scott, II, '22 (D).
 Assistant Purchasing Agent, Harvard Univer-
 sity, Cambridge, Mass.
Richardson, George Oliver, IV, '16 (B.T.D.).
 Manager, Special Products Division, National
 Aniline Division, Allied Chemical & Dye Cor-
 poration, 40 Rector Street, New York City.

Richardson, Richardson Perry, I, '13 (D).
 7 Fairmont Street, Lowell, Mass.
Riggs, Homer Chase, VI, '17 (B.T.E.).
 President, Riggs & Lombard, Inc., Lowell,
 Mass.
Ripley, George Keyes, II, '17 (D).
 President, Troy Blanket Mills, Troy, N. H.
Ritchie, Newell Baird, IV, '40 (B.T.C.).
 Chemist, Wilton Woolen Company, Wilton,
 Me.
Rivers, William Anthony, II, '24 (D).
 Manager, Metropolitan Life Insurance Com-
 pany, Marlboro, Mass.
Roarke, John James, IV, '36 (B.T.C.).
 With Martin Dyeing & Finishing Co., Bridge-
 ton, N. J.
Robbins, Lucy Wiley, VI, '37 (B.T.E.).
 See Weinbeck, Mrs. John C.
Robbins, Walter Archibald, VI, '30 (B.T.E.).
 Assistant to Plant Engineer, Columbia Mills,
 Inc., Minetto, N. Y.
Roberson, Pat Howell, I, '05 (C).
 Vice-President, Union State Bank, Pell City,
 Ala.
Roberts, Angus Henry, IV, '41 (B.T.C.).
 Assistant in Science, Phillips-Exeter Academy,
 Exeter, N. H.
Roberts, Carrie Isabel, IIIB, '05 (C).
Robillard, Gerald Adelbert, IV, '33 (B.T.C.).
 Chemist and Salesman-Demonstrator, Ca-
 nadian Industries, Ltd., Montreal, Que.
Robinson, Ernest Warren, IV, '08 (D).
 Manager, Line Division, The Shakespeare
 Company, Kalamazoo, Mich.
Robinson, Russell, VI, '21 (B.T.E.).
 Supervisor, Warwick Mills, West Warwick,
 R. I.
Robinson, William Albert, II, '25 (D).
 Shipbuilding, Ipswich, Mass.
Robinson, William Carleton, III, '03 (C).
 With Durand Shoe Company, Auburn, Maine.
Robson, Frederick William Charles, IV, '10 (D).
Rodalvitz, Francis Rudolph, IV, '28 (B.T.C.).
 Assistant Chemist, American Woolen Com-
 pany, Wood Worsted Mills, Lawrence, Mass.
Roth, Paul, VI, '40 (B.T.E.).
 With National Felt Company, Easthampton,
 Mass.
Rowntree, Clyde Burton, IV, '39 (B.T.C.).
 Textile Chemist, Pacific Mills, Worsted Divi-
 sion, Lawrence, Mass.
Royal, Louis Merry, VI, '21 (B.T.E.).
 Teacher of Mathematics, East Senior High
 School, Pawtucket, R. I.
Rundlett, Arnold Dearborn, VI, '12 (D).
 Superintendent, Joseph Noone's Sons Com-
 pany, Peterborough, N. H.
Runnells, Harold Nelson, IV, '25 (B.T.C.).
 32 Franklin Street, Concord, N. H.
Russell, Harold William, VI, '32 (B.T.E.).
 In Charge of Testing and Research Laboratory,
 Goodall Worsted Company, Sanford, Me.
Russell, John William, IV, '20 (B.T.C.).
 Chemist, American Lanolin Corporation, Law-
 rence, Mass.
Russell, William Samuel, Jr., VI, '28 (B.T.E.).
 Textile Division Manager, Keasbey & Mat-
 tison Co., Ambler, Pa.
Ryan, David Louis, II, '27 (D).
 Sales Representative, Duplan Silk Corpora-
 tion, 18 West Chelton Avenue, Philadelphia,
 Pa.
Ryan, Lawrence Francis, IV, '23 (B.T.C.).
 Chemist and Demonstrator, E. I. du Pont de
 Nemours & Co., Inc., Wilmington, Del.
Ryan, Millard Kenneth Thomas, Jr., II, '24 (D).
 Rayon Technician, E. I. du Pont de Nemours
 & Co., Inc., Wilmington, Del.
Ryberg, Bertil August, IV, '29 (B.T.C.), '36 (M.S.).
 Associate Director of Research, American
 Association of Textile Chemists and Colorists,
 Lowell Textile Institute, Lowell, Mass.

Sadler, Thomas Sheridan, II, '30 (D).
 With Carolina Asbestos Company, Davidson,
 N. C.

- Saltsman, Sidney Irving, IV, '41 (B.T.C.).**
Ensign, U. S. Naval Reserve.
- Sampson, Clifford William, IV, '28 (B.T.C.).**
Sales Manager, Chemical Division, Emery Industries, Inc., Cincinnati, Ohio.
- Sanborn, Frank Morrison, VI, '19 (B.T.E.).**
With Winstboro Cotton Mills, Winstboro, S. C.
- Sanborn, Ralph Lyford, VI, '16 (B.T.E.).**
Purchasing Agent, Firestone Cotton Mills, Inc., Gastonia, N. C.
- Sandlund, Carl Seth, VI, '25 (B.T.E.).**
In Charge of Testing, Dyeing & Throwing, Proper-McCallum Hosiery Company, Northampton, Mass.
- Sargent, Robert Edward, IV, '25 (B.T.C.).**
Chemist, Tubize Chatillon Corporation, Rome, Ga.
- Sargent, Walter Ambrose, I, '22 (D).**
Instructor, Textile Shop Practice, Board of Education, Passaic, N. J.
- Saunders, Harold Fairbairn, IV, '09 (D).**
301 West 8th Street, Coffeyville, Kans.
- Savard, Aime Albert, Jr., IV, '33 (B.T.C.).**
Printing Department, United States Finishing Company, Norwich, Conn.
- Savery, James Bryan, II, '23 (D).**
Treasurer, Savery Manufacturing Company, Hartford, Conn.
- Sawyer, Henry Severance, VI, '32 (B.T.E.).**
Treasurer, Sawyer, Regan Company, Dalton, Mass.
- Sawyer, Richard Morey, VI, '27 (B.T.E.). (M.S., 1929, Massachusetts Institute of Technology.)**
Office Manager, Firestone Cotton Mills, Inc., Gastonia, N. C.
- Scanlon, Andrew Augustine, IV, '26 (B.T.C.).**
- Schaetzel, Andre Paul, IV, '21 (B.T.C.).**
Chief Chemist, Aspinook Corporation, Jewett City, Conn.
- Schiffer, Lathrope Adolph, VI, '41 (B.T.E.).**
Production Department, Cohn-Hall-Marx, New York, N. Y.
- Schneiderman, Jacob, III, '27 (D).**
Golf Professional, Mt. Pleasant Country Club, Leicester, Mass.
- Schoelzel, Herman Walter, IV, '35 (B.T.C.).**
Overseer of Dyeing, Mascoma Mills, Lebanon, N. H.
- Schreiter, Ehrich Ernest Max, VI, '26 (B.T.E.).**
Engineer, Sun Oil Company, Revere, Mass.
- Schwarz, Herman Louis, IV, '22 (B.T.C.).**
Textile Chemist, Sandoz Chemical Works, Inc., 61 Van Dam Street, New York City.
- Scott, Gordon Maxwell, IV, '20 (B.T.C.).**
Finisher, Princeton Worsted Mills, Inc., Trenton, N. J.
- Shaber, Hyman Jesse, VI, '17 (B.T.E.). M.B.A., 1922 Harvard Graduate School of Business Administration.**
Shoe Buyer and Merchandiser, J. S. Raub Shoe Store, Wilkesbarre, Pa.
- Shah, Kantilal Hiralal, VI, '36 (B.T.E.).**
India.
- Shah, Shantilal Hiralal, IV, '34 (B.T.C.). (M.B.A., 1936, Harvard Graduate School of Business Administration.)**
India.
- Shain, Joseph, IV, '35 (B.T.C.).**
Of Cowan & Shain, 280 River Street, Haverhill, Mass.
- Shanahan, James Edward, II, '22 (D).**
Textile Inspector, Quartermaster Depot, U. S. War Department, Philadelphia, Pa.
- Shananquet, Mrs. Lee (Woodies, Ida A.), IIIB, '00 (C).**
- Shann, William Edwin, II, '35 (D).**
Section Hand, English Drawing, Pacific Mills, Lawrence, Mass.
- Shapiro, Sidney, VI, '38 (B.T.E.).**
Salesman, Pierce Lithographic Corp., Lawrence, Mass.
- Shapiro, Simon, VI, '34 (B.T.E.).**
With Lifco Webbing Company, Fall River, Mass.
- Shea, Francis James, II, '12 (D).**
- Shea, John Francis, IV, '28 (B.T.C.).**
Demonstrator, Becco Sales Corporation, 207 A Street, Boston, Mass.
- Shedd, Jackson Ambrose, III, '28 (D).**
Stylist, Forstmann Woolen Co., Passaic, N. J.
- Sheehan, Leo James, IV, '38 (B.T.C.).**
Assistant Technologist, Quartermaster Depot, U. S. War Department, Jeffersonville, Ind.
- Shelton, Charles Leopold, VI, '29 (B.T.E.).**
Textile Engineer, Nye-Wait Co., Auburn, N. Y.
- Shenker, Nahman, III, '25 (D).**
Senior Textile Inspector, Federal Government, Brooklyn, N. Y.
- Sidebottom, Leon William, IV, '11 (D).**
Chief Chemist, Boston Blacking & Chemical Company, Cambridge, Mass.
- Silberstein, Raymond, III, '39 (D).**
103 Lafayette Avenue, Passaic, N. J.
- Silverman, Joseph Melvin, VI, '40 (B.T.E.).**
U. S. Army.
- Sinski, Henry Anthony, VI, '41 (B.T.E.).**
Inspector of Textile, Quartermaster Depot, Philadelphia, Pa.
- Sjostrom, Carl Gustaf Verner, Jr., III, '17 (D).**
Designer, Peerless Woolen Mills, Rossville, Ga.
- Skalkaas, Basil George, IV, '41 (B.T.C.).**
U. S. Army, 2nd Chemical Company, MacDill Field, Tampa, Fla.
- Slamin, Alfred Francis, I, '26 (D).**
Sales Manager, Benjamin Franklin Paint and Varnish Company, Philadelphia, Pa.
- Sleeper, Robert Reid, IV, '00 (D).**
Colorist, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.
- Smith, Allen Batterman, I, '26 (D).**
Turner Halsey Company, 40 Worth Street, New York City.
- Smith, Doane White, II, '10 (D).**
15 Oakland Street, Natick, Mass.
- Smith, Frank Kenfield, II, '24 (D).**
Technician, Grout's Ltd., St. Catharines, Ont.
- Smith, Harold, IV, '34 (B.T.C.).**
Chemist, Quartermaster Depot, Philadelphia, Pa.
- Smith, Herbert Jeffers, VI, '22 (B.T.E.).**
Sales Representative, U. S. Ring Traveler Company, Providence, R. I.
- Smith, Lawrence, Lt. (SC) U. S. N., VI, '40 (M.S.). (B.S., U. S. Naval Academy, 1932.)**
Naval Clothing Depot, Brooklyn, N. Y.
- Smith, Ralston Fox, I, '04 (C).**
- Smith, Roger Dennis, II, '27 (D).**
Assistant Superintendent, M. T. Stevens & Sons Co. (Pentucket Mills), Haverhill, Mass.
- Smith, Theophilus Gilman, Jr., IV, '10 (D).**
Farming, Groton, Mass.
- Snelling, Fred Newman, II, '03 (D).**
With the American Railway Express Company, Haverhill, Mass.
- Sokolsky, Henry, VI, '17 (B.T.E.).**
Manager, Planning & Production Dept., B. F. Sturtevant Company, Hyde Park, Mass.
- Somers, Benjamin, II, '25 (D).**
- Sood, George David, IV, '38 (B.T.C.).**
Technician in Research Department, Slatersville Finishing Company, Slatersville, R. I.
- Southwick, Charles Hudson, IV, '22 (B.T.C.).**
Assistant Dyer, Slatersville Finishing Company, Slatersville, R. I.
- Spalding, Arthur Ovila, IV, '32 (B.T.C.).**
Technical Man on Wool and Worsted, Sandoz Chemical Works, Inc., New York City.
- Spanos, James Peter, IV, '37 (B.T.C.).**
With Farr Alpaca Company, Holyoke, Mass.
- Spevack, Edward, IV, '39 (B.T.C.).**
Attending Officers' Infantry Training School, Fort Benning, Ga.
- Spiegel, Edward, II, '03 (C).**
- Stacey, Alfred Charles, IV, '30 (B.T.C.).**
Textile Technologist, Shoe Lace Company, Lawrence, Mass.
- Standish, John Carver, IV, '11 (D).**
Superintendent, Albany Felt Company, Albany, N. Y.
- Stanley, John Prince, Jr., IV, '29 (B.T.C.).**
Assistant Chemist, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
- Stass, John George, II, '27 (D).**
Textile Analyst, Better Fabrics Testing Bureau, 101 West 31st Street, New York City.

- Steadman, Frank M., VI, '39 (M.S.).** (B.S., U. S. Military Academy, 1929). Major, Quartermaster Corps, U. S. Army, Philadelphia, Pa.
- Stearns, Kenneth Lawrence, IV, '33 (B.T.C.).** Dye House, Pacific Print Works, Lawrence, Mass.
- Steele, Everett Vernon, IV, '24 (B.T.C.).** Production Manager, Rohn & Haas Co., South Gate, Calif.
- Stein, William Joseph, VI, '35 (B.T.E.).** Executive, Milton C. Blum, New York, N. Y.
- Steinberg, Sidney, VI, '39 (B.T.E.).** U. S. Army.
- Stephens, Arnold George, I, '29 (D.).** With Wm. S. Haynes, 108 Massachusetts Avenue, Boston, Mass.
- Stevens, Raymond Russell, IV, '19 (B.T.C.).** Chief Chemist, The Felters Company, Inc., Millbury, Mass.
- Stevens, William Edwin, I, '34 (D.).** With B. B. & R. Knight Corporation (Royal Mill), River Point, R. I.
- Stevenson, Murray Reid, III, '03 (C.).**
- Stewart, Alexander, VI, '31 (B.T.E.).**
- Stewart, John Weeden, IV, '30 (B.T.C.).** New England Representative, Geo. E. Sherman Co. of Brooklyn, N. Y., Waltham, Mass.
- Stewart, Walter Lawrence, III, '03 (D.).**
- Stiegler, Harold Winfred, IV, '18 (B.T.C.).** (M.S., 1922, Ph.D., 1924, Northwestern University.) Head of Textile Chemicals Division, American Cyanamid Company, Stamford, Conn.
- Stohn, Alexander Charles, III, '06 (C.).** Factory and Production Manager, Carl Stohn, Inc., East Taunton, Mass.
- Stolzberg, Howard Nathaniel, IV, '35 (B.T.C.).** Chemist and Owner, Jaybee Chemical Company, Haverhill, Mass.
- Stone, Ira Aaron, IV, '09 (D.).** With Riverside Mills, Augusta, Ga.
- Storer, Francis Everett, II, '07 (D.).** Meredith, N. H.
- Storey, Alvin Briggs, VI, '28 (B.T.E.).** Textile Superintendent, Celanese Corporation of America, Cumberland, Md.
- Stott, John Smith, III, '28 (D.).** With Newmarket Manufacturing Company, Lowell, Mass.
- Stowell, Eldon, A.B., I, '39 (D.).** Assistant to Manager, Sales Service Department, Tubize Chatillon Corp., New York, N. Y.
- Stronach, Irving Nichols, IV, '10 (D.).** Superintendent, Hampton Company, East-hampton, Mass.
- Strout, Kenneth Edward, III, '28 (D.).** Designer, United Elastic Corp., New Haven, Conn.
- Sturtevant, Albert William, IV, '17 (D.).** Foreman, Lowell Motor Sales, Inc., Lowell, Mass.
- Sturtevant, Fred William, IV, '26 (B.T.C.).** Chemist, Naugatuck Chemical Division, United States Rubber Products, Inc., Naugatuck, Conn.
- Suhle, Waldo Eric, IV, '20 (B.T.C.).** Teacher, Jefferson Junior High School, Meriden, Conn.
- Sullivan, John David, VI, '12 (D.).** With Robert Gair Company, Bradford, Mass.
- Sullivan, Lambert William, II, '23 (D.).** Instructor in Textiles, Massachusetts Reformatory, West Concord, Mass.
- Sullivan, Paul John, IV, '41 (B.T.C.).** U. S. Army.
- Sullivan, Willard David, II, '23 (D.).** Breene's Store, Lowell, Mass.
- Sunbury, Herbert Ellsworth, VI, '18 (B.T.E.).** Sales Engineer, U. S. Rubber Co., Passaic, N. J.
- Sung, Harvey Chih, VI, '37 (B.T.E.).** 7 Min Yuan Hsi Li, Colombo Road, Tientsin, China.
- Sutcliffe, Henry Mundell, II, '25 (D.).** Second Hand, Webster Mills, Webster, Mass.
- Sutton, Leslie Emans, I, '17 (D.).** Manager, Anniston Cordage Company, Anniston, Ala.
- Swain, Harry LeRoy, Jr., I, '26 (D.).** Purchasing Department, Firestone Tire & Rubber Co., Akron, Ohio.
- Swan, Guy Carleton, II, '06 (D.).** Chief Chemist, N. Y. Station, Food and Drug Administration, Federal Security Agency, 201 Varick Street, New York City.
- Swanson, John Harold, I, '28 (D.).** Superintendent, Georgia-Kincaid Mills, Griffin, Ga.
- Sweat, Safford Pershing, IV, '40 (B.T.C.).** U. S. Army, Fort Sill, Okla.
- Sweeney, George Hamilton, II, '24 (D.).** Salesman, Walker Stetson Company, 147 Essex Street, Boston, Mass.
- Swiatek, Bronislaw John, VI, '40 (M.S.).** (B.S., Tri-State College, 1938.)
- Swift, Edward Spooner, S. J., I, '02 (D.).** Administrator of Boston College, Chestnut Hill, Mass.
- Syme, James Francis, II, '00 (D.).** Director and Officer, Hayward-Schuster group of mills, East Douglas, Mass.
- Symmes, Dean Whiting, IV, '22 (B.T.C.).** Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston, Mass.
- Szymosek, Frank John, IV, '41 (B.T.C.).** Experimental Dyehouse and Finishing Station, American Viscose Corporation, Marcus Hook, Pa.

T

- Tamulonis, Edward William, VI, '30 (B.T.E.).** Production Manager, Newmarket Manufacturing Company, Lowell, Mass.
- Tang, Hsiung-Yuan, I, '30 (D.).**
- Tarpey, Thomas Joseph, IV, '27 (B.T.C.).** 23 Fremont Street, Somerville, Mass.
- Tarshis, Elias Aaron, IV, '28 (B.T.C.).**
- Tartikoff, Jordan Alvin, VI, '41 (B.T.E.).** Form and Motion Study Engineering, Maiden Form, Inc., Bayonne, N. J.
- Teague, Charles Baird, II, '26 (D.).** Civil Engineer, Highway Division, Massachusetts Public Works Department, Boston, Mass.
- Thaxter, Joseph Blake, Jr., II, '12 (D.).** Sales Executive, Ludlow Manufacturing & Sales Corporation, 211 Congress Street, Boston, Mass.
- Thayer, Walter Stephen, VI, '40 (B.T.E.).** With Pacific Mills, 261 Fifth Avenue, New York, N. Y.
- Thomas, Benjamin, Jr., VI, '34 (B.T.E.).** Overseer, Jackson Mills, Nashua, N. H.
- Thomas, Henry Edward, VI, '40 (B.T.E.).** Engineering Draftsman, C. G. Sargent's Sons Corp., Granitville, Mass.
- Thomas, Robert Joseph, IV, '34 (B.T.C.).** (M.S., 1937, Ph.D., 1939, University of Notre Dame.) Research Chemist, E. I. du Pont de Nemours & Company, Inc., Wilmington, Del.
- Thomas, Roland Vincent, I, '05 (C.).** With Chicopee Sales Corporation, 40 Worth Street, New York City.
- Thompson, Arthur Robert, Jr., IV, '22 (B.T.C.).** Salesman, Ciba Company, Inc., Charlotte, N. C.
- Thompson, Everett Leander, I, '05 (D.).** 53 Morse Avenue, Brockton, Mass.
- Thompson, George Robert, IV, '35 (B.T.C.).** Textile Chemist, United States Finishing Company, Norwich, Conn.
- Todd, Walter Ernest, III, '23 (D.).** Agent, Metropolitan Life Insurance Company, Uxbridge, Mass.
- Toepler, Carl, IV, '22 (B.T.C.).** Superintendent of Permanent Finishing, Bellman Brook Bleachery Company, Fairview, N. J.
- Toher, Francis Luke, IV, '32 (B.T.C.).** In Charge of Dyeing, Lebanon Knitting Mill Company, Pawtucket, R. I.
- Topjian, Leon, IV, '30 (B.T.C.).** 416 Massachusetts Avenue, Boston, Mass.
- Toshach, Reginald Alexander, II, '11 (D.).** Proprietor, Toshach's Mill Remnants, Haverhill, Mass.

- Toupin, Stephane Frederick, VI, '24 (B.T.E.).**
Plant Engineer, Regent Knitting Mills, Ltd.,
St. Jerome, Quebec.
- True, William Clifford, II, '22 (D).**
Assistant Superintendent, Ludlow Manufacturing
& Sales Co., Allentown, Pa.
- Turcotte, David Henry, IV, '33 (B.T.C.).**
33 Ellis Avenue, Lowell, Mass.
- Turner, George Robert, IV, '41 (B.T.C.).**
Chemist & Colorist, E. I. du Pont de Nemours
& Co., Wilmington, Del.
- Tyler, Bernard James, IV, '36 (B.T.C.).**
Technical Sales, Albi Chemical Corp., New
York, N. Y.
- Tyler, Lauriston Whitcombe, II, '16 (D).**
Manager, W. T. Grant Company, Brunswick,
Me.

U

- Urlaub, George Samuel, IV, '41 (B.T.C.).**
Graduate Student, Lowell Textile Institute,
Lowell, Mass.

V

- Valentine, Burnet, VI, '23 (B.T.E.).**
With A. D. Juilliard & Co., Inc., New York,
N. Y.
- Valentine, Preston Sumner, IV, '36 (B.T.C.).**
With American Seal-Kap Corporation, Long
Island City, N. Y.
- Valvanis, Nicholas John, IV, '40 (M.S.). (B.S.,
Massachusetts State College, 1939.)**
Textile Chemist, A. M. Tenney Associates,
Inc., New York City.
- Vaniotis, Socrates Vasilios, IV, '37 (B.T.C.).**
Assistant Chemist, Sidney Blumenthal & Co.,
Inc., Shelton, Conn.
- Varnum, Arthur Clayton, II, '06 (D).**
U. S. Textile Inspector.
- Villa, Luis Jorge, IV, '25 (B.T.C.).**
With Fabrica de Hilados y Tejidos del Hato,
Medellin, Colombia, S. A.
- Villa, William Horace, VI, '24 (B.T.E.).**
Technical Director, Fabrica de Hilados y
Tejidos del Hato, Medellin, Colombia, S. A.
- Villeneuve, Maurice Arthur, II, '26 (D).**
With Killingly Worsted Mills, Danielson,
Conn.
- Vincent, William Henry, III, '26 (D).**
18 Albion Street, Hyde Park, Mass.

W

- Wagner, George Frederic, Jr., VI, '38 (B.T.E.).**
Superintendent, Gonie Mfg. Co., Gonie, N. H.
- Walen, Ernest Dean, VI, '14 (B.T.E.).**
Vice-President, Pacific Mills, Lawrence, Mass.
- Walker, Alfred Schuyler, II, '11 (D).**
67 Park Avenue, Saranac Lake, N. Y.
- Walker, Anna Gertrude, IIIB, '03 (C).**
See Pradel, Mrs. Alois J.
- Walker, Raymond Scott, II, '23 (D).**
Production Superintendent, Arlington Mills,
Lawrence, Mass.
- Walker, Samuel J., IV, '32 (B.T.C.).**
Analyst, National Association of Dyers and
Cleaners, Silver Springs, Md.
- Wallace, Joseph Max, IV, '31 (B.T.C.).**
With Enequist Chemical Company, 255 Free-
man Street, Brooklyn, N. Y.
- Wang, Chen, IV, '23 (B.T.C.).**
- Wang, Cho, VI, '23 (B.T.E.).**
- Wang, Tung Chuan, VI, '23 (B.T.E.).**
- Wang, Yun-Cheng, VI, '31 (B.T.E.).**
Assistant Manager, Sung Sing Cotton Mill
No. 1, Shanghai, China.
- Wang, Yung Chi, II, '21 (D).**
- Ward, George Chester, IV, '28 (B.T.C.).**
Research Chemist, Celanese Corporation of
America, Cumberland, Md.
- Warren, E. Maybelle, IV, '28 (B.T.C.).**
See McBee, Mrs. Damon F.
- Warren, Philip Hamilton, II, '05 (D).**
Superintendent, Hopeville Manufacturing
Company, Worcester, Mass.
- Washburn, John Milton, Jr., IV, '21 (B.T.C.).**
New England Manager, Emery Industries,
Inc., 187 Perry Street, Lowell, Mass.

- Watson, William, III, '11 (D).**
Real Estate, Wm. Watson, 50-54 Merrimack
Street, Haverhill, Mass.
- Webber, Arthur Hammond, IV, '01 (D).**
6 Longwood Avenue, Beverly, Mass.
- Webster, Joseph Albert, VI, '23 (B.T.E.).**
Production Manager & Raw Material Buyer,
Stehli & Co., Inc., New York, N. Y.
- Weil, Clarence Bernard, IV, '41 (B.T.C.).**
Control Chemist, Crompton Company, West
Warwick, R. I.
- Weinbeck, Mrs. John C. (Robbins, Lucy W.),
VI, '37 (B.T.E.).**
102 South Loring Street, Lowell, Mass.
- Weinstein, Edward Joseph, VI, '25 (B.T.E.).**
Harrison Hardware Company, Harrison, N. Y.
- Welch, William Paul, Jr., IV, '36 (B.T.C.).**
Insurance Agent, Boston Mutual Life Insur-
ance Company, Lowell, Mass.
- Wells, Al Edwin, VI, '20 (B.T.E.). (Ed.M. 1937,
Boston University.)**
Assistant Professor, Textile Engineering De-
partment, Lowell Textile Institute, Lowell,
Mass.
- Wells, Henry Alfred, Jr., IV, '33 (B.T.C.).**
Production Engineering Department, Wright
Aero Corporation, Paterson, N. J.
- Westaway, John Chester, VI, '28 (B.T.E.).**
Secretary-Treasurer, W. J. Westaway Co., Ltd.,
Hamilton, Ont., and Vice-President, Sonoco
Products Company of Canada, Ltd., Brant-
ford, Ont.
- Westbrooke, Clayton Collington, IV, '29
(B.T.C.).**
Chemist, Bigelow-Sanford Carpet Company,
Thompsonville, Conn.
- Wetherbee, Francis Putney, I, '28 (D).**
Flint River Cotton Mills, Albany, Ga.
- Wheaton, Walter Francis, VI, '23 (B.T.E.).**
Buyer, Genung's, Inc., New York City.
- Wheelock, Silas Mandeville, Jr., II, '39 (D).**
With Smith & Winchester Company, South
Windham, Mass.
- Wheelock, Stanley Herbert, II, '05 (D).**
President and Treasurer, Stanley Woolen
Company, Uxbridge, Mass.
- Whitcomb, Roscoe Myron, IV, '10 (D).**
Pharmacist, R. M. Whitcomb, Ashland, N. H.
- White, Royal Philip, II, '04 (D).**
Resident Manager, American Woolen Com-
pany, Sawyer Mills, Dover, N. H.
- Whitehill, Warren Hall, IV, '12 (D).**
Overseer of Dyeing, Pacific Mills, Worsted
Department, Lawrence, Mass.
- Wiech, Raymond Edward, IV, '29 (B.T.C.).**
- Wiesner, Arthur Charles, II, '39 (D).**
With Rhode Island Worsted Company, Staf-
ford Springs, Conn.
- Wightman, William Henry, IV, '06 (D).**
Salesman, Ciba Company, Inc., 157 Federal
Street, Boston, Mass.
- Wilcox, Leonard Edward, VI, '24 (B.T.E.).**
179 Varnum Avenue, Lowell, Mass.
- Wilkie, Robert Campbell, VI, '34 (B.T.E.).**
Research Engineer, Pacific Mills, Lawrence,
Mass.
- Wilkinson, Herbert William, Jr., IV, '37
(B.T.C.).**
Technical Director, Southbridge Finishing
Company, Southbridge, Mass.
- Williams, Albert William, III, '32 (D).**
Designer, Manhattan Shirt Company, New
York, N. Y.
- Williamson, Douglas Franklin, I, '22 (D).**
Assistant to General Superintendent, Granite
Falls Manufacturing Company, Granite Falls,
N. C.
- Wilman, Rodney Bernhardt, II, '25 (D).**
Superintendent, New England Fibre Blanket
Company, Worcester, Mass.
- Wilson, Raymond Bachman, II, '36 (D).**
With International Narrow Fabric Company,
Keene, N. H.
- Wing, Charles True, III, '02 (D).**
Paymaster, M. T. Stevens & Sons Company,
Draught, Mass.
- Wingate, William Henry, IV, '08 (D).**
Instructor, Bradford-Durfee Textile School,
Fall River, Mass.

- Winkler, Burton Cole, IV, '39 (B.T.C.).**
Partner-Head Dyer, Waverly Piece Dye Works, Elizabeth, N. J.
- Wise, Paul Tower, II, '01 (D).**
President, Chelsea Fibre Mills, 1155 Manhattan Avenue, Brooklyn, N. Y.
- Wojas, Stanley Edward, IV, '33 (B.T.C.).**
Chemist, Massachusetts Mohair Plush Company, Lowell, Mass.
- Wolf, Irving Jacob, VI, '41 (B.T.E.).**
With Oneita Knitting Mills, Utica, N. Y.
- Woo, Tsunkwei, VI, '19 (B.T.E.).**
- Wood, Ernest Hadley, S.B., IV, '11 (D).**
- Wood, James Carleton, IV, '09 (D).**
Sales Representative, R. T. Vanderbilt Company, New York City.
- Wood, Lawrence Burnham, IV, '17 (B.T.C.).**
Chemist, Arkwright Corporation, Fall River, Mass.
- Woodard, Alice M., VI, '41 (B.T.E.).**
See Lane, Mrs. Joseph J., 2nd.
- Woodard, Malcolm Russell, IV, '40 (B.T.C.).**
Textile Chemist, Research & Development Dept., Colgate-Palmolive-Peet Co., Jersey City, N. J.
- Woodbury, Kenneth Leroy, VI, '28 (B.T.E.).**
Designer, Sidney Blumenthal & Company, Shelton, Conn.
- Woodcock, Eugene Close, II, '07 (D).**
Manager, Jute Yarn Department, Ensign Bickford Company, Simsbury, Conn.
- Woodhead, Joseph Arthur, VI, '23 (B.T.E.).**
Technical Service Division, Research and Development Department, Colgate-Palmolive-Peet Company, Jersey City, N. J.
- Woodies, Ida Alberta, IIb, '00 (C).**
See Shanquet, Mrs. Lee.
- Woodman, Harry Lincoln, I, '02 (C).**
Salvage Foreman, Monsanto Chemical Company, Merrimack Division, Everett, Mass.
- Wormwood, Herbert Alvin, IV, '36 (B.T.C.).**
Textile Chemist, Watson-Park Company, 261 Franklin Street, Boston, Mass.
- Worthen, Clifford Tasker, IV, '22 (B.T.C.).**
Dyer, F. C. Huyck & Sons, Kenwood Mills, Albany, N. Y.
- Workowicz, Michael Joseph, VI, '20 (B.T.E.).**
- Wright, Edward, II, '05 (C).**
Sanitary Engineer, Massachusetts Department of Public Health, 511A State House, Boston, Mass.
- Wright, George Ward, IV, '38 (B.T.C.).**
Chemist, Gustavus T. Esselin, Inc., 857 Boylston Street, Boston, Mass.
- Wu, Clarence Wen-Lon, VI, '25 (B.T.E.).**
- Wu, Tsung-Chieh, VI, '25 (B.T.E.).**
- Wynn, William Joseph, Jr., IV, '34 (B.T.C.).**
Overseer of Dyeing and Finishing, Lawrence Woolen Company, Lawrence, Mass.

Y

- Yacumbian, Gamaliel Mardiros, II, '40 (D).**
29 Day Street, Somerville, Mass.
- Yavner, Harry, II, '12 (D).**
Merchant, Mayo's Hardware Company, Jamaica Plain, Mass.
- Young, Edmund Joseph, Jr., IV, '33 (B.T.C.).**
U. S. Inspector (Powder & Explosives), War Department, Boston, Mass.
- Yung, E-Zung, I, '32 (D).**

Z

- Zalkind, Benjamin Joseph, VI, '29 (B.T.E.).**
Textile Engineer, Saco-Lowell Shops, Biddeford, Me.
- Zellweger, Ralph John, VI, '41 (B.T.E.).**
Ensign, U. S. Navy.
- Ziock, LeRoy, II, '25 (D).**
President, Ziock Industries, Inc., Rockford, Ill.
- Zisman, Louis Samuel, IV, '20 (B.T.C.).**
Gotham Silk Hosiery Company, Inc., Philadelphia, Pa.

BULLETIN

of the

Lowell Textile Institute

LOWELL, MASS.

Issued Quarterly

1942-1943

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Moody Street and Colonial Avenue

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LOWELL EVENING TEXTILE SCHOOL

TRUSTEES OF THE LOWELL TEXTILE INSTITUTE

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On the Part of the City of Lowell
Hon. GEORGE T. ASHE, Mayor of Lowell

FOR TERM ENDING JUNE 30, 1942

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ROLAND E. DERBY, Lawrence, Proprietor, The Derby Company
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STEPHEN R. GLEASON, Lowell, Superintendent, Walter L. Parker Bobbin & Spool Company
JOSEPH E. LEMIRE, Lowell, Teacher, Lowell High School

FOR TERM ENDING JUNE 30, 1943

HAROLD E. CLAYTON, Lowell, Treasurer and Manager, Clayton Hosiery Mills, Inc.
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HAROLD T. GODFREY, North Andover, Director, Davis & Furber Machine Company
LOUIS S. HAYES, Boston, Union Color & Chemical Company, Boston
WALTER B. FRENCH, Lowell, Manager, Appleton Company

FOR TERM ENDING JUNE 30, 1944

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EDWARD C. ENO, Lowell Electric Light Corporation
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MELVILLE WESTON, Lowell, Treasurer, Newmarket Manufacturing Company

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Professor of Textiles; in charge of Department of Wool Yarns.	
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Instructor and Registrar.	
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ARTHUR JOSEPH WOODBURY	41 Morey Street.
Instructor in Cotton Department.	
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PAUL DAVID PETTERSON	East Chelmsford.
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Evening Instructor in Geometry.	
FRANCIS T. O'HEARN	19 Princeton Boulevard.
Evening Instructor in Mathematics.	
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Evening Instructor in Mathematics.	
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Evening Instructor in Art.	
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Evening Instructor in Weaving.	
IRA DWINNELL	83 Clark Avenue.
Evening Instructor in Practical Electricity.	
NANCY R. HOSMER	22 Livingston Avenue.
Evening Instructor in Pattern Alteration.	

CALENDAR—1942

September 24, Thursday	Registration
October 1, Thursday	Registration
October 5, Monday	Opening of evening school
October 12, Monday	Columbus Day—Holiday
November 11, Wednesday	Armistice Day—Holiday
November 26-27, Thursday and Friday	Thanksgiving Recess. No classes
December 18, Friday	End of first term

1943

January 4, Monday	Opening of second term
March 5, Friday	Closing of evening school
April 6, Tuesday	Graduation

GENERAL INFORMATION

Entrance Requirements

All applicants to the evening classes must understand the English language and simple arithmetic. Those who are graduates of a grammar or high school are admitted upon certificate. Those who cannot present such a certificate are required to take examination in the subjects of English and arithmetic. In the examination in English a short composition must be written on a given theme, and a certain amount must be written from dictation. In the examination in arithmetic the applicant must show suitable proficiency in addition, subtraction, multiplication, division, common and decimal fractions, percentage, ratio and proportion. Opportunity to register or to take these examinations is offered each year, generally on the Thursday evenings of the two weeks previous to the opening of the evening school.

Registration

Before entering the class a student must fill out an attendance card, which can be obtained at the office or from the instructors in the various departments.

Any student who has filed an attendance card and who wishes to change his course must notify the office before making the change.

Sessions

The evening classes commence the first Monday of October and continue for twenty weeks. The school is open on four evenings each week during the period mentioned, except when the school is closed for holiday recesses.

Supplies

Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Students' supplies will be sold from the co-operative store every evening school night from 6.45 to 8.15 P.M.

Fees and Deposits

All evening courses are free to residents of Lowell, but students must file a certificate of residence signed and sealed by the city clerk of Lowell. Those who do not file such certificate will be considered non-residents.

To non-residents of Lowell the fee is \$10 per year for *each course of two nights per week*. Students taking two courses or attending courses requiring more than two nights per week are required to pay \$15 per year for three nights and \$20 for four nights.

All fees and deposits must be paid in advance.

All students, whether from Lowell or not, taking Course 411, Chemistry and Dyeing Department, are required to make a deposit at the commencement of the course—\$5 for first-year students, and \$10 for second-year students. A deposit of \$10 will be required of all students taking Course 412, 413 or 414. This is to cover the cost of laboratory breakages, chemicals, apparatus, etc., and at the end of the year any unexpended balance is returned, or an extra charge made for the excess breakage.

All students taking Machine-Shop Practice will be required to make a deposit of \$5. Any unexpended balance remaining at the end of the year will be returned to the student.

Report of Standing

A report of standing covering the year's work is sent to all students who attend the entire year and take the necessary examinations.

Certificates

The courses of the evening school are varied and arranged to meet the special needs of those engaged in the industry. They vary in length from one to four years, and at the completion of each course the certificate of the school is awarded, provided, however, that the student has been in attendance in the course during the year for which the certificate is granted.

GENERAL EVENING COURSES

The object of these courses is to give young men of ambition an opportunity to obtain instruction in all the branches of science that are allied with their daily work. For example, one who is employed as a weaver in a textile mill may obtain knowledge of the manufacture of yarn, the production of a design, and the methods of finishing a fabric, as well as the manner of its weaving or knitting. In like manner the dyer may augment his knowledge of the chemicals and materials he is daily handling. The engineer and machinist may acquire a knowledge of the mathematics, science of mechanics, electricity and drawing that underlie all the work of an engineer.

It is recognized that the interests of such students lie in a particular field of industry, and these courses are designed to bear directly upon the special line, and supplement, as far as possible, the practical work in which the student is engaged during the day.

In a word, any man having a common school education and the ambition to advance in his line may now secure a broad and comprehensive training in the subjects which will be of vital importance to him in obtaining the goal of his ideal.

A description of all courses follows.

COTTON DEPARTMENT

The courses offered in the Cotton Department are intended for those interested in cotton yarn manufacture and sales. In addition to the value for those directly connected with the carding and spinning departments, the courses offer an opportunity for students who are working in the mill office or the selling office. Men selling supplies to cotton mills will find in these courses an opportunity to become acquainted with the business and its problems which will make possible a more complete service to their customers.

111. Cotton Yarns—2 Years

The *first year* work in cotton yarn manufacture includes a study of cotton and its preparation for market, followed by a study of opening, picking, carding and combing. This work consists of lectures on these operations combined with problems that are peculiar to each operation such as the drafts used, the production of each process and the amounts of waste made. Special consideration is given to the adjustment and care of these machines and some laboratory demonstration is used to show the manner of adjusting machines for the purpose of controlling the weight of the product, the amount of work done in a day and the amount of waste made.

Two evenings each week.

COTTON.—This course starts with a study of cotton growing, the areas producing cotton and the characteristics of cottons from the various producing areas. The effects of seed selection, cultivation, and weather conditions on the cotton are emphasized.

Picking and ginning of cotton are studied to show the importance of proper preparation of lint for mill consumption.

There is a general survey of the intricate cotton marketing system, illustrating the methods of specifying cotton desired and securing delivery at a known price.

OPENING AND PICKING.—As this equipment has changed considerably in recent years, special notes are used illustrating modern machinery and its arrangement. Machine parts, construction and adjustment, are discussed in the classroom and demonstrated in the laboratory. Mixing of cottons for colored work or for price control is considered under these processes.

CARDING.—The process of carding is considered one of the most important, and proper time is devoted to the construction and operation of cards that the student may be familiar with the various parts of the card and the function and design of each. The construction and application of card clothing, and the methods of grinding form a part of the work. Some time is given to a discussion of the waste made in carding, the regulation of the amounts of each made and the calculation of the percentages. New and special attachments for various purposes are brought to the attention of the class, illustrating possible ways of improving carding conditions.

COMBING.—The preparation of card sliver for combing by means of the sliver lapper and ribbon lapper is thoroughly considered. The combing operation itself is studied in considerable detail, emphasizing the general object and operations in

combing and the specific means employed by various types of combs in performing the operations. The calculations in this connection involve the drafts and doublings necessary to produce the proper lap for the comb, the proper comb drafts, and the determination of the per cent of noil produced.

The *second year* work in cotton yarn manufacture includes a study of the operations of drawing, roving, spinning, winding and twisting. The work consists largely of lectures and problems with some laboratory demonstrations to make the student familiar with the machines and the points of adjustment.

Two evenings each week.

DRAWING.—The instruction on drawing introduces the principles of roller draft and the theory of doublings. Special attention is given to roll covering materials and their application. The measurement of uniformity of slivers by various methods is considered here.

ROVING.—Roving includes the various machines known as the slubber, intermediate, fine and jack fly frames. Each of the various motions of these complicated machines is treated separately and then the group is taken as a unit, tying each operation in with the others. Particular attention is paid to the subjects of lay and tension because of their importance in producing perfect roving. The calculations in this subject involve draft, twist, lay and tension with particular attention to the derivation of constants and their use. The new systems of long draft for roving frames are included in this work.

RING SPINNING.—A study of the various types of yarns gives the student an appreciation of the necessary characteristics for various purposes and how these may be obtained. Standard draft and long draft systems are studied in detail. Important machine parts, such as guides, travelers, rings and builders, their adjustment and care, form an important part of this subject. Yarn faults and defects are shown and their causes explained.

SPOOLING AND WINDING.—The discussions under this head cover the treatment of single yarns in preparation for twisting, comparing the relative merits of spooling with multiple winding on tubes, and beaming for special twiststers. Winders are also considered as a means of preparing yarn packages for sale yarns.

TWISTING.—Because of the similarity to ring spinning, the emphasis here is more on the manufacturing part of the work, although there are a few peculiar features of a mechanical nature. The twisting of various regular ply yarns, the making of numerous fancy yarns and the principles underlying the production of various patterns are taken up. The use of special twiststers and other apparatus for cords and ropes is considered under this heading.

113. Knitting—1 Year

This is a general course on the manufacture of knitted fabrics and garments, intended for those interested in the principles of knitting and a study of the mechanisms of a variety of knitting machines. The more important phases of the course are:—

YARNS AND YARN SIZING SYSTEMS.—In order that the student may understand the distinctions between yarns, terminology, and the various sizing systems commonly used, several lectures are devoted to yarn characteristics and sizing as a basis for the entire course. This covers cottons, woolens, worsteds, silks and rayons.

FLAT MACHINES.—These relatively simple machines make a fine starting point in establishing clearly the action of the latch needle and how it is operated. Lamb, Dubied, Grosser, and Links and Links machines are used as a basis for this part of the work.

SMALL CIRCULAR RIBBERS.—These machines are a very logical step, following flat machines. Brinton, Wildman, and Universal ribbers, with different pattern mechanisms, are used in illustrating this type of work.

AUTOMATIC HOSIERY MACHINES.—This section of the course is built around the various Banner and the Scott and Williams half and full hose machines. Most of the work is done with the plain machines as there is not sufficient time to include the fancy pattern type.

LARGE RIBBERS AND SPRING NEEDLE MACHINES.—Underwear fabric and webbing are produced on this type of equipment. Scott and Williams, Wildman, Tompkins and Crane machines are the basis for instruction along these lines.

FULL FASHIONED MACHINE.—A brief study of the full fashioned principles and actions is based on the Reading 18-section machine in the laboratory.

WARP KNITTING.—Using the Raschel machine in the laboratory, a general study of warp knitting includes Tricot and Milanese work also.

ANALYSIS.—During the study of the various machines, considerable attention is given to the many "stitches" possible. This, coupled with the lectures on fabric and hosiery analysis, covers the common analysis problems.

ROUTINES.—The usual sequence of manufacturing processes for hosiery and underwear are studied with the idea of illustrating the steps necessary in producing different articles.

Most of the instruction in this course is given by lectures. As many of these machines are small, it is common practice to bring the machine under discussion into the classroom so that students may see the machine and parts being considered. In other instances, the class may go into the laboratory to see the equipment and its operation.

114. Cotton Organization—1 Year

This course, offered only to those who have completed the work in Carding and Spinning, is a study of the common arrangements of drafts, sizes and production details for manufacturing various cotton yarns. Illustrative problems demonstrate how to provide for "balancing" a mill or how to divide equipment to produce different yarns in given quantities.

Some time is devoted to discussing various common machinery layouts and the number of operatives required for certain manufacturing arrangements. Typical mill job analysis problems involving time study and end breakage tests are considered.

Two evenings each week.

WOOLEN AND WORSTED DEPARTMENT

211. Woolen Yarns—1 Year

Instruction consists of lectures on technology of wool fiber (for detailed description see Course 217) and woolen yarn manufacture. This covers all the operations in detail necessary to manufacture yarns from raw stock on the woolen principle, and includes lectures and laboratory work on burr picking, wool blending, mixing, picking, wool oils and emulsions, carding, spinning on both mule and ring frame, and plain and novelty twisting.

Reworked fiber is covered in detail from rag sorting to finished staple.

Three evenings each week.

217. Wool and Top Making—1 Year

Instruction consists of lectures in technology of wool fibers, worsted carding and combing, and mechanism and calculations.

TECHNOLOGY OF WOOL FIBRES—*one evening each week*

RAW MATERIALS.—The study of raw materials which enter into the manufacture of woolen or worsted yarns or hardened felts, or are made into yarns by processes similar to those employed in the manufacture of woolen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel hair, cut staple rayon, etc. In connection with these are considered shoddy, noils, and extracts.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lectures. The various characteristics and properties are explained, as are also trade terms, such as Fine, $\frac{1}{2}$ -blood, $\frac{3}{4}$ -blood, 56^s, 36^s, B super, delaine, braid, etc. Over 1,500 samples of wool and other fibers gathered from all the countries of the world are catalogued and are available for inspection and study. Wool shrinkages are studied as are also spinning qualities. A complete collection of literature pertaining to sheep, wool, etc. is available for outside reading or study.

WOOL SCOURING.—The objects of scouring or degreasing and the methods employed are explained. This involves the consideration of soaps and chemicals used in scouring and degreasing, also the waste products and their utilization. A sorted lot of grease wool is scoured by machines that are made similar in operation to regular commercial wool scouring machines. At the same time the use of driers, their operation and regulation, is taken up.

CARBONIZING.—The methods of carbonizing wool, noils, burr waste, rags, etc. are studied. If time permits, a commercial quantity of stock is carbonized on the regulation carbonizing machines in the wool laboratory.

WORSTED CARDING AND COMBING—*one evening each week*

CARDING.—The different types of worsted cards are studied in detail, as well as the construction, setting and operation of cards. A part of this work consists of a study of card clothing, its construction, application, grinding, setting, etc.

COMBING.—This branch takes up the preparing processes, backwashing, also gilling of the stock before and after combing. The construction of the gill boxes and Noble comb is studied by lectures. Two Noble combs are available for inspection and study.

The French comb is studied, and the various calculations to determine draft, noiling, productions, etc., are made.

MECHANISM AND CALCULATIONS—*one evening each week*

This subject gives the principles of the various mechanisms used in wool manufacturing machines. Among the topics dealt with are—equations, surface speed, R. P. M., drivers, drivens, draft and production calculations, stop motions, combing layouts, levers, logarithms, top testing, calculations, etc.

218. Worsted Yarns—1 Year

Instruction is devoted to detail study of the English and French systems of worsted yarn manufacture.

DRAWING AND SPINNING.—The equipment in the laboratory offers opportunity to make worsted yarn by either the Bradford or open drawing system or by the French system. The process includes the various machines in the successive steps of making Bradford spun yarn, and the functions of the different machines are studied. In the latter, or French system, the stock is run through the drawing machines, and the roving spun into yarn on the worsted mule or frame. The same method of studying the mechanism and operations of these machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

With the instruction in spinning by the Bradford system is given work on the twistors and the effects that may be produced.

Three evenings each week.

TEXTILE DESIGN AND WEAVING DEPARTMENT

311. Cotton Design—3 Years

During the *first year* instruction is given in elementary designing, starting with all the foundation weaves which may be used in fabrics such as the plain weave, rib weaves, basket weaves, twill weaves, satin weaves, granite weaves, etc. Combination and derivative weaves are made up from the aforesaid weaves. Fancy and figured weaves, in most cases originated by the student, are produced. Color effects, which are so essential in fabrics, obtainable from the different weaves, as stated above, in which the color arrangement of warp and filling create the pattern, are thoroughly considered. Not only the designing, but also harness drafting and the making of dobby chains for all type of weave is taken up.

Cloth analysis is considered in conjunction with designing, as a designer must know the kind of fabric he is designing, what material and what size of yarns are to be used, and how heavy and costly the cloth is to be. The various topics discussed are the sizes or counts of yarns made from all kinds of fibers, such as cotton, woolen, worsted, silk, rayon, jute and yarns of other vegetable fibers. Their relative length to the pound is determined in the single two or more ply, mixed yarns, novelty yarns and fancy yarns, in the American or English system. The same is given in the metric system. Problems involving the take-up of yarns in the weaving and finishing process are given. Samples of cloth are picked apart to determine their weaves and general construction.

Two evenings each week.

In the *second year* cloth analysis and design are combined in lecture and practice, starting with plain and leading into the more fancy cotton dobby fabrics. A great variety of samples of cloth are used in class work to determine ends and picks per inch, shrinkage in warp and filling, and the number of reed and reed widths necessary for eventual reconstruction. The yarn numbers of warp and filling are determined by aid of fine balances. The amount of warp and filling necessary for a piece of

goods is calculated and the weight of a whole piece as well as the number of yards per pound are determined.

Two evenings each week.

In the *third year* more elaborate cloths are considered, both in designing and analysis, cloths in which extra warp or extra filling, or both, are used. Warp backed, filling backed, double, triple or more plied fabrics are taken up, such as marseilles, quilting, pique, suspenders, narrow webbings, velveteens, fancy velveteens, velvets, corduroys, Bedford cords, plushes, leno, in fact, anything a student may suggest which might help him in his work.

Two evenings each week.

312. Woolen and Worsted Design—3 Years

This course covers the design and analysis of standard woolen and worsted fabrics and is intended for those who wish to specialize in this branch of textile fabric manufacture. Special and fancy fabrics are studied to the extent that time will permit.

During the *first year* instruction is given in the subject of classification of fabrics, use of points or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks and stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

The analysis of samples is taken up in a systematic manner, illustrating the various cloth constructions for the purpose of determining the design of the weaves and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric.

Two evenings each week.

During the *second year* instruction is given in cotton warp goods, blankets, bath robes, filling reversible, extra warp and filling backs, figured effects produced by extra warp and filling, double cloths and plaid backs.

The analysis work follows as closely as possible the type of fabrics taken up in the designing and the reconstruction of these fabrics with the consideration of their shrinkage and composition.

Two evenings each week.

In the *third year* instruction is given in multiple fabrics, chinchilla, Bedford cords, crepon, matelasse and imitations, double plains, meltons, kersey, plush and suitings. At this time also is taken up the construction of designers' blankets, suggestion cards, and the construction of samples.

The construction of new fabrics from theoretical viewpoint together with the construction from suggestion cards is taken up. In connection with this work instruction is given in making cost estimates for both woolen and worsted fabrics.

Two evenings each week.

313. Decorative Art—3 Years

During the first ten weeks the work consists of charcoal drawing from plaster models and group arrangements of still life. The second ten weeks deals with pastel drawing of still life groups, depending upon the progress and interest of the students.

Two evenings each week.

During the second year instruction is given in figure drawing from the model.

Two evenings each week.

In the third year the student chooses one of the following options:

1. Color Harmony—its mixes and uses.
2. Perspective—a mechanical method of correct drawing.

Two evenings each week.

314. Show Card Design—2 Years

LETTERING.—During the *first year* the student is taught to master the drawing,

with pencil, of a few very plain alphabets, both upper and lower case letters, also plain figures. With the characteristics of plain letter alphabets well in mind, it is but a few steps to make any of the more intricate ones. Following this he will make simple "lay-outs" of plain card signs, and then take up the lettering, with brush and paint, of some of his simple card designs.

Two evenings each week.

The second year is simply a continuation of the latter part of the first year work, with the addition of advanced design in the "lay-out" and color-scheme of practical show cards and posters, such as are designed and lettered in the up-to-date Show Card Shop of to-day.

Two evenings each week.

316. Pattern Alteration—1 Year

This includes a general understanding of the alteration of the commercial pattern as well as alterations for the student's own figure problems.

Two evenings each week.

321. Cotton Weaving—1 Year

The Course in Cotton Weaving covers instruction on plain looms, Draper Automatic and Stafford Automatic looms. It includes instruction on the construction of shedding and picking motions, take-up and let-off motions together with the operation of the magazines and hoppers and methods of changing shuttle and bobbin. A study is also made of the preparation of warps, beaming, sizing and drawing-in. The Crompton and Knowles Automatic Towel Looms, and the various types of box looms, including chain building and work on multipliers, are also considered in this course.

Two evenings each week.

322. Woolen and Worsted Weaving—1 Year.

This course includes instruction on the Crompton and Knowles loom and takes up general construction, head motions, take-up, let-off, filling stop motion, etc. The preparation of warps, wet and dry dressing, is given in connection with this course.

Two evenings each week.

324. Loom Fixing—1 Year

The course in Loom Fixing takes up the timing of all the different motions in the loom, such as the shedding, picking, and adjustment of the shuttle boxes on the 4 x 4 Crompton & Knowles and Draper box and automatic looms, and the setting for the Baker shuttle changing mechanism.

In addition there are many trouble hints given and the various remedies for improper setting. Box chain and harness chain planning and building is also taken up.

Two evenings each week.

CHEMISTRY AND DYEING DEPARTMENT

Hardly any branch of applied science plays so important a part in our industrial world as chemistry. Many large mills employ chemists as well as dyers, and with the great progress which is being made in the manufacture and application of dye-stuffs, a basic knowledge of chemistry becomes an absolute necessity to the dyer. Within a comparatively short distance from Lowell are establishments employing men who require some knowledge of chemistry but who may not necessarily use dyes. Some find a knowledge of analytical chemistry helpful in their everyday work.

To meet these varying needs of our industrial community, the school offers a two-year course in general chemistry, organic and inorganic, which may be followed by any one of three courses, viz., textile chemistry and dyeing, analytical chemistry, and textile and analytical chemistry. In order to take Course 412, 413 or 414, candidates must have a certificate from Course 411, or show by examination or approved credentials that they have taken the equivalent of the work covered by this course.

411. Elementary Chemistry—2 Years

General Chemistry, including Inorganic and Organic.
Qualitative Analysis.

One lecture and one Laboratory Period per week in General Chemistry the first year, continued three nights a week during the second year, when the Elementary Organic Chemistry and Qualitative Analysis is completed.

Instruction in Elementary Chemistry extends through two years, and includes lectures, recitations and a large amount of individual laboratory work upon the following subjects:—

THEORETICAL CHEMISTRY.—Chemical action, chemical combination, combining weights, atomic weights, chemical equations, acids, bases, salts, Avogadro's law, molecular weights, formulæ valence, periodic law, etc.

NON-METALLIC ELEMENTS.—Study of their occurrence, properties, preparation, chemical compounds, etc.

METALLIC ELEMENTS.—Study of their occurrence, properties, metallurgy, chemical compounds, etc.

The students take up, as thoroughly as time will permit, the qualitative detection of the more common metals and non-metals, with practical work.

This work, although necessarily elementary, is intended to prepare the student to study more understandingly the manufacture of dyestuffs and coal tar colors in the more advanced courses which follow.

During the *first year* of the Elementary Chemistry course most of the time is devoted to the non-metals and theoretical chemistry, and the laboratory work covers briefly the non-metals.

Two evenings each week.

During the *second year* the classroom work is upon metals and the hydrocarbons and their derivatives, and the laboratory work consists entirely of Qualitative Analysis. While this course is necessarily taken up in an abbreviated and elementary manner, it is so arranged that the students may become familiar with the separations and the detections of the common metals and acids. This course is also preliminary to the work given in Analytical Chemistry.

Three evenings each week.

412. Textile Chemistry and Dyeing—3 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Dyeing.

Covered by 60 lectures and two nights of laboratory work per week.

The outline of the lecture course given in Textile Chemistry and Dyeing is as follows:—

TECHNOLOGY OF VEGETABLE FIBERS.—Cotton, linen, jute, hemp, china grass. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ANIMAL FIBERS.—Wool, mohair, silk. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ARTIFICIAL FIBERS.—Study of the various forms of artificial silk, the process of manufacture, their properties and action with chemicals, acids and heat.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching, action of soap.

The bleaching of cotton is studied with description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is included a study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods of degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods of detection, their effect during the different operations of bleaching, scouring, dyeing and printing, and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING, AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds not dyestuffs that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting principles and leveling agents.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, tumeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used in recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown, iron buff.

ARTIFICIAL COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and systematic experiments the student learns the nature of the various dyestuffs and mordants, their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool and silk, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye baths, etc.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines.

413. Analytical Chemistry—3 Years

Laboratory Work and Lectures in Quantitative Analysis.

Three nights each week of class-room and laboratory work.

The object of this course is to give the student a general idea of the underlying principles of Analytical Chemistry, with a sufficient amount of laboratory work to enable him to become proficient in performing the ordinary routine analysis of the textile plant. Frequent recitations are held for the discussion of methods and the solution of stoichiometrical problems.

The work covered the first two years is based on Smith's "Quantitative Analysis," and for the advanced work, consists of the analysis of soap, water, oils, coal and other materials of particular interest to the textile chemist. Special lecture notes are given and Griffin's "Technical Methods of Analysis" is used as a text.

414. Textile and Analytical Chemistry—4 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Analytical Chemistry.

Combines all lectures in Textile Chemistry and Dyeing with work of Course 413, but does not include any Dyeing Laboratory.

Three evenings each week.

415. Chemistry and Technology of Leather—1 Year

Requirements: Two years of evening elementary chemistry and two years of inorganic quantitative analysis. A student without this preparative background or its equivalent will not be admitted to this course.

This is a one year course and treats of the chemistry and technology of leather manufacture. All the tannery processes are taken up with special emphasis on the purpose of each operation. In respect to the chemistry involved a short introduction to the chemistry of proteins and fats and the action of enzymes is presented, and the usual analytical methods are considered. Throughout the course mention is made of recent developments and fields of research.

The early part of the course consists entirely of lectures (three one-hour periods). The latter part consists of one weekly lecture and a two-hour laboratory session.
Two evenings each week.

ENGLISH DEPARTMENT

511. English Composition—2 Years

First Year.—REMEDIAL ENGLISH AND RHETORIC.—In order to write well it is necessary to have a thorough understanding of grammar. Moreover, it is a great satisfaction to know why you are correct in speaking and writing in a certain way. This course is designed to give a comprehensive survey of necessary grammatical and rhetorical principles. The course of instruction consists of lectures, recitations, remedial exercises, and the study of a text book.

One evening each week.

Second Year.—THE PRINCIPLES OF COMPOSITION.—This is an advanced course and is not open to students who have not completed the first year or its equivalent. The primary purpose of this course is to give the student the ability to write clearly and correctly. An intensive study is made of the four divisions of composition—narration, description, exposition, and argumentation—and the art of letter writing. Selections from various authors to be read for general interest and for the purpose of illustration, are assigned for outside reading. Lectures are given; and home work, the study of a text book, and examinations are required.

One evening each week.

512. Appreciation of Literature—1 Year

This subject is offered for those who wish to enlarge their cultural background and to study the principles of literary appreciation and criticism. Altho there will be emphasis upon literary technique, the constant aim will be to keep this subordinate to the spirit and the message of the selection.

The prose and the poetry studied will be treated analytically, with directed investigation of the various literary appeals—the intellectual, the sensory, the emotional, the aesthetic, the imaginative, and the philosophical. Emphasis will also be placed upon the value of an extensive reading program. (This course will not be given if the registration is less than twenty-five.)

One evening each week.

TEXTILE ENGINEERING DEPARTMENT

This department has arranged to offer those courses of study which lie at the foundation of all engineering. These are designed to give to those engaged in the mechanical, electrical, and manufacturing departments of mills, factories and other industrial establishments an opportunity to learn something concerning the theory underlying the many practical methods which they use in their daily work. Those subjects for which there is usually a regular demand are listed and described below, but similar and allied courses will also be arranged for provided there is a sufficient demand. In the case of all courses there must be an enrollment of at least ten properly qualified students to warrant giving the subject.

613. Mechanical Drawing—3 Years

This course is a complete course in drawing and is offered for one having occasion to make a sketch or detail drawing for the purposes of illustration or instruction, or for one who is daily required to work from a drawing or blueprint. It first lays a foundation of the principles of mechanical drawing, and follows this with two years' work in drawing directly from parts of machines, preparing both the detail and the assembly drawing.

The work is so planned that at its completion a man shall be thoroughly familiar with the making of a working or shop drawing. After a study of the underlying principles of projections and instruction in penciling, inking, lettering and tracing, the subject of sketching and the making of detail drawings therefrom is especially stressed. The preparation of assembly drawings is finally considered.

Two evenings per week.

614. Machine Shop Practice—2 Years

This course offers an opportunity to learn the art of metal working and is equally valuable to the man who already has some knowledge of the methods employed as

to one who has no knowledge of the same. Thus it becomes possible for one who may be working at the bench during the day to learn how to operate a lathe or other machine tool, or for a lathe hand to acquire a knowledge of a planer, shaper, milling machine, or grinder. A series of lectures is given on the care and management of tools, tool grinding, and the mechanism of the machines. A man who only has a knowledge of the special machine he operates may by means of this course become a more intelligent machinist. He should supplement this study with the courses in Mechanical Drawing, Shop Mathematics, Mechanics, and Mechanism, in order that his training for an all-round machinist or mechanic may be more complete.

Two evenings each week.

619. Mechanics—1 Year

This is one of the most important of engineering subjects. Its principles are so fundamental and so widely used in more advanced subjects that the student should not consider himself qualified for further work until he has mastered the principles of this subject.

Beginning with a discussion of such important topics as work, power, horsepower, energy and the like, the student then studies the fundamental mechanical principles which are exemplified by the lever, jackscrew, pulley block, inclined plane, wedge, differential pulley and other similar devices. This is followed by consideration of the simpler relations pertaining to uniform and accelerated motion. No student should undertake this course who is not thoroughly familiar with elementary mathematics. This subject requires home problem work and the study of a text book.

Two evenings each week.

620. Mathematics—2 Years

This course is designed to permit the student to pursue further the mathematics of his grammar or junior high school course, and should be taken by all who intend to study further into engineering subjects. The first year work in algebra includes addition, subtraction, multiplication, division, factoring and fractions. Some of the topics treated during the second year are graphical representation, linear equations, radicals, quadratic equations, logarithms, slide rule and trigonometry. Instruction is largely through problem work in class and at home and requires the use of a text book.

Two evenings each week.

621. Strength of Materials—1 Year

This interesting subject deals with those important principles whereby the person engaged in machine, engine, mill or building design may ascertain whether the parts are strong enough to carry the forces and loads which the nature of the construction imposes upon them.

The fundamental stresses of tension, compression and shear are first considered, together with the ultimate strength of cast iron, wrought iron, steel, and timber. The practical use of this information is illustrated in the design of bolts, tie rods, columns, wall piers, boiler shells, riveted joints, etc. This is followed by a study of the stresses in and design of beams under various conditions of loading, and the course concludes with a discussion of the torsional stresses and twist in shafts. A knowledge of the principles of Mechanics and Mechanism is highly desirable to a satisfactory understanding of this subject. The method of instruction is through lectures, recitations, problems, and the use of a text book.

Two evenings each week.

622. Steam—1 Year

It is the purpose of this course to study the various methods of heat generation, transmission, and utilization in use at the present day and to learn the theoretical relationship which underlie these processes and transformations.

The instruction covers, so far as time permits, the elements of steam engineering. The topics covered are heat and its measurement, use of steam tables, types of boilers, engines and turbines, boiler and engine room accessories, together with a study of the methods of testing the various types of apparatus. Actual tests on such equipment are made as the size of the class permits. Text books, laboratory and class work, and home problems are the methods of instruction used.

Two evenings each week.

623. Direct Current Electricity—2 Years

This popular course is planned to cover the fundamentals of direct current circuits and machinery. The lectures on electrical theory are supplemented by laboratory work and the use of a text book and problems. A considerable amount of home study and preparation is required. Students who wish to take this subject must have studied one year of algebra.

The fundamental properties of electrical and magnetic circuits are studied both in the classroom and laboratory. Other topics include the measurement of resistance, the calculation and measurement of power in direct-current circuits, and the relation between the electrical, heat and mechanical units of energy. A large amount of laboratory and class work is given to make the student familiar with methods of operation, testing and control of direct current machinery.

Two evenings each week.

624. Alternating Current Electricity.—2 Years

This course is similar to Course 623 except that it deals with alternating current circuits and machinery. No student should plan to take this course unless he has previously taken at least one year of Course 623 or can show that he has had the equivalent.

The fundamental properties of alternating current circuits are first considered, and are followed by a study of the operation of alternating current machinery. The study of electrical measuring instruments is also included in this course. The instruction is given by means of lectures, recitations, and a large amount of laboratory work.

Two evenings each week.

625. Power Plant Machinery—1 Year

The purpose of this course is to teach the operating engineer how to test the various units usually found in a power plant. Numerical calculations are introduced and the interpretation of the results is of primary importance.

The following are some of the machines tested: engine, turbine, triplex pump, centrifugal pump, injector, etc. Various gages are also calibrated. A text book is required.

Two evenings each week.

626. Mill Illumination—1 Year

Safety and production, factors entering into the design of lighting installations, industrial codes, costs and estimates are carefully considered. The laboratory exercises include the study of photometric curves of industrial units, study and use of the photometer, study of illumination by means of the Macbeth Illuminometer, and foot-candle meter.

The concluding work will be the complete design of a lighting installation, using the Institute laboratories or a local mill room.

Owing to limitations in apparatus, this course is open to a limited number of qualified men.

Two evenings each week.

628. Selling and Advertising—1 Year

This course covers the basic principles of both salesmanship and advertising. Problems on the construction of individual advertisements, selling talks, and the planning of advertising campaigns, give the student an opportunity to put into practice the principles covered in the lectures.

The psychology of selling and advertising, copy writing, layout, printing and engraving, illustrations, testing of advertising, advertising campaigns, building a selling talk, retail salesmanship, and showmanship are some of the topics treated.

Two evenings each week.

630. Mechanism—1 Year

This course deals with those principles and elementary mechanism which are used in the transmission of motion through machines and mechanical devices. It requires a knowledge of the principles developed in "mechanics" and hence can be taken only by qualified students. The instruction includes pulleys, belting, gears, gearing, cams and similar topics. Home problem work and the study of a text book are required.

Two evenings each week.

631. Plane Geometry—2 Years

In this course the usual theorems and constructions of good text-books are studied. The topics include the properties of plane rectilinear figures, the circle and measurement of angles, similar polygons, areas, regular polygons and the measurement of the circle. Solutions of original exercises and applications of geometry in calculation of angles, areas, and lines will also be given. Assignments for home study will be made.

Two evenings each week.

632. Diesel Engines—1 Year

The object of this course is to present an elementary study of Diesel engines, their operation, and maintenance. The subjects studied include—the various forms of Diesel engines in general, two and four cycle, semi-Diesel, etc.; a comparison between gasoline and oil engines; fuel oils—heat value, properties; fuel injection systems—control, timing, distribution; combustion—efficiency, control, products; engine parts and their functions—assembly, clearances, wear; lubricating oils—properties, filtration; cooling systems—heat transfer, radiation; air intake and exhaust systems—supercharging, silencing, heat recovery; starting systems—air, electric, gasoline; engine installations—vibration; engine applications—mobile, stationary; and maintenance in general for an entire power plant.

No student should undertake this course who is not familiar with elementary physics and mathematics, as considerable time will be spent on the materials used and the reactions involved in an internal combustion engine. The subject requires home problem work, study of a text book, and examination at the end of each term.

Two evenings each week.

633. Shop Mathematics—1 Year

This subject deals with the practical application of mathematics which is of the greatest use to machinists or those in similar lines of work. It consists of those parts of arithmetic, algebra, geometry and trigonometry, which are essential in modern machine shop practice. Some of the topics are:—fractions and decimals, logarithms, problems in ratio and proportion, areas of surfaces, calculation of angles, solution of right and oblique triangles.

In addition to the mathematical work, the scientific principles which govern the operation of various machines are studied. In this connection the following topics are included:—verniers and micrometers, levers, belt and gear speeds, screw threads and screw cutting, gear tooth computations, plain and differential indexing. This subject requires home problem work and the study of a textbook.

Two evenings each week.

634. Air Conditioning—2 Years

The subjects covered in this course include the following; fundamental laws, principles and definitions; physical properties of the atmosphere; explanation of words and terms used, such as—matter, energy, heat, heat energy, temperature, ice, water, vapor, gas, steam, thermometers, hygrometers, hydrometers, barometers, pressure, gage pressure, absolute pressure, absolute temperature, laws of gases, heat units, vapor pressure, dew point, evaporation, condensation, precipitation, relative and absolute humidity; sensible heat, latent heat, specific heat, total heat of air, effective temperature, comfort zones, air movement, ventilation; movement of heat and air, infiltration, conduction, solar heat, air leakage; heat from human beings; lights, machinery and processes; humidification and dehumidification, heating and cooling, air filtration, air washing; refrigeration and refrigerants, cooling by water, ice, typical air-conditioning equipment, typical control equipment, thermostats, humidostats, wet and dry bulb type; use of charts and tables, costs, etc.

Students are required to hand in complete details for producing prescribed conditions of temperature and humidity in some building in or near Lowell, Mass., before completing the course.

One evening each week.

635. Practical Electricity—1 Year

The purpose of this course is to aid students who wish to advance themselves in any one of the electrical trades. The course will cover the underlying facts and laws of good electrical practice which the really well-informed and efficient workman must understand.

Lectures will be given one night each week on the following subjects: the nature of magnetism, Ohm's Law, simple electric circuits, combinations of series and parallel systems, wiring diagrams, electric bulbs and telephones. The practical part of the course, given one night each week, is divided into several experiments which will give the student a working knowledge of electrical wiring and installations.

Two evenings each week.

Accounting Classes (Division of University Extension)

Classes in Elementary, Advanced and Cost Accounting have been offered in past years at the Lowell Evening Textile School under the auspices of the Division of University Extension, State House, Boston, Mass. Their continuance is dependent upon a sufficient expression of interest in them. Outlines of the courses, fees, etc., may be obtained by inquiry at the above address or by addressing the school.

FINISHING DEPARTMENT

In this course machine work is supplemented by lectures and discussions pertaining to the many finishes given to fabrics. The action of soaps, water, steam, heat and cold upon cloth containing one fiber or combination of fibers as used in commercial fabrics is carefully studied. This course also helps the finisher to broaden his knowledge of textile fabrics.

710. Woolen and Worsted Finishing—1 Year

The outline of this course, which is given chiefly by means of lecture work, is as follows:

BURLING AND MENDING.—Under this head are taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are also considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the various types of stocks and their modifications and development into the present type of rotary fulling mills of both single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, method of covering, regulation and means of adjusting the pressure of traps and rolls, and the use and regulation of the various types of stopmotion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hygroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the production of various degrees of felt, as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The manipulation of the various kinds of goods in the mill, viz., all wool, reworked wools and mixed goods, is studied in classroom and by operation in the laboratory.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and sours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods,

are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING AND STEAMING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In the manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year.

Two evenings each week.

EVENING GRADUATES OF 1942.

Certificates awarded as follows, April 8, 1942:

Knitting—One Year

Hugh Cahay Hill, Lowell
Arthur Thebner, Lowell

Roland Henry Thurber, Lowell
Nicholas Zaricki, Manchester, N. H.

Wool and Top Making—One Year

Willard Walter Beebe, Graniteville
Ernest Leslie Birdsall, Andover
Peter John Boudras, Lowell
Louis Charles Broughton, Andover
William Albert Cartier, Lawrence
Edward Cooper Clarenbach, North Andover
John Clarke, Methuen
Alfred Eaton, Jr., Methuen
Joseph Kondrat, Lawrence
James Francis Mahoney, Lawrence

Robert Newton, Forge Village
Matthew Adam Novak, Lawrence
Hann Makan Panosian, Boston
William Stanley Shires, Lowell
Francis Irvin Stokham, Lowell
James Owen Sullivan, Lawrence
Gordon Everett Taylor, Lawrence
William Maxwell Thomson, North
Andover
Raymond Clegg Whittaker, Lawrence

Woolen Yarns—One Year

Stephen Barbett, North Andover
Joseph Andrew Calzone, Methuen
Ernest Arthur Comeau, Saugus
James Paul Etchells, North Andover
Raymond Gates Flanders, Nashua, N. H.
James Frederick Guilfoyle, Lawrence

Edward Paul Law, Worcester
Samuel Royce McMaster, Lowell
John Charles Maselunas, North Andover
Kauko Rudolph Saari, Maynard
Warren Westbrook Wills, Saugus
Sidney Robert Wordsworth, Hudson

Worsted Yarns—One Year

Francis Stanley Dzioba, Lawrence
Niall Orrin Fleming, Lawrence
James Munro McComish, North Andover

Henry Walter Narushof, Lowell
James Thomas Olsen, Lawrence
Ernest Francis Stokham, Lowell

Cotton Design—Three Years

Frederick Albion Lefebvre, Lowell
Robert Edward Noonan, Lowell

Sylvester Arthur Thomas, Shirley

Woolen and Worsted Design—Three Years

Donald Edwards Button, Lowell
Ida Monica Coppeta, Methuen
Kenneth John Crandall, Dracut
Edward Joseph Dziadosz, Methuen
Alfred Howard Hildebrandt, Lawrence

William Donald Kennedy, Lawrence
James Lucius Marshall, Lowell
Louis Philip Pellerin, Lowell
John Norman Ward, North Chelmsford
Harry William Williams, Methuen

Show Card Design—Two Years

John Stergios Panagiotou, Lowell

Dora Zouvelos, Lowell

Decorative Art—Three Years

Leona Irene Blacktin, Lowell
James Joseph Dalton, Lowell

Edward Anthony Silva, Lowell

Woolen and Worsted Weaving—One Year

Manuel Alexandropoulos, Lowell
Walter Melvin Choquette, Lawrence
John Chulada, Lawrence
Francis Coan, Lowell
Arthur Thomas Hale, Jr., North Andover
Charles Clement LeClaire, Lawrence
Benoit Albert Mercier, Lowell
Anthony Louis Mitsakos, Lowell

Francis John Morse, Methuen
Bronislaw Cejul Obara, Lowell
Raymond Robert Robertson, Lowell
William Plunkett Rockwell, North
Andover
John Lawrence Salwa, Lowell
Edward Seubert, Jr., Lawrence
James John Szeligo, Lowell

Cotton Weaving—One Year

Arthur William Gendron, Lowell
 Emiliana Marion Jardin, Lowell
 Thomas Whitmore Kelleher, Lowell

Charles Arthur Lowell, Lowell
 Amelia Lyko, Lowell

Loom Fixing—One Year

Lucien Romeo Boisvert, Manchester, N.H.
 Leo Joseph Dalphond, Lowell
 Edward Arthur Hebert, Lowell
 Eric Henry Huikari, Maynard
 Albert Leo Laferriere, Lowell
 John Edward McCusker, Lowell
 Bronislaw Cejul Obara, Lowell

Anthony Francis Paolino, Methuen
 Joseph Eugene Plourde, Manchester, N.H.
 Stanley Joseph Szymanski, Collinsville
 John Baptiste Tetreault, Lowell
 Leonard George Tuminowski, Methuen
 John Kevin Walsh, Lowell

Woolen and Worsted Finishing—One Year

Albert Edward Asmega, Lawrence
 Edward Roger Beaulieu, Ballardvale
 Chester Burton Brown, Methuen
 Harold Albert Bryant, Jr., Methuen
 Raymond Joseph Collins, Lawrence
 James Edward Cummings, North Andover
 Kenneth Karem Daher, Lawrence
 John Melvin French, Maynard
 William Augustine Ganley, Lawrence
 David Gardner Grady, North Billerica

Edward Lorenzo Hapshe, Lawrence
 Richard Hurrell, Methuen
 John Henry Leacock, Lawrence
 Harry Edwin Mason, Lawrence
 Edward Frederic Miller, Lawrence
 George William Murray, Lowell
 William Plunkett Rockwell, North
 Andover
 Norman Albert Trumbull, Lawrence
 Charles Joseph Valarose, Lowell
 Walter Joseph Wood, Jr., Methuen

English Composition—Two Years

Charlotte Anna Dexter, Lowell
 Jeanne Marie Champagne, Lowell
 Joseph James Howe, Lowell
 Eleanor Mary Loftus, Lowell
 Elizabeth Anne McGuigan, Lowell

Patricia Marylyn Mulryan, Lowell
 Ruth Louise Potter, North Billerica
 Mary Adeline Rule, North Billerica
 Edwin Tyler Shaw, Lowell

Appreciation of Literature—One Year

Jennie Bograkos, Lowell
 Evangeline Nancy Gekas, Lowell

Claire Greta Sampas, Lowell

Mechanical Drawing—Three Years

Arthur Huntley Cady, Hudson, N. H.
 Albert Louis Gaudette, Lowell
 Stanley Joseph Grondalski, Lowell
 Paul Albert Jussaume, Lowell

Bernard Edmund Konieczny, Draught
 Paul Joseph Lemire, Lowell
 Hutchins Coolidge Bennett, Lowell

Alternating Current Electricity—Two Years

George Bernard Fallon, Jr., Andover
 Paul Richard Pelletier, Nashua, N. H.

Carl Lewis Tapper, Lowell

Direct Current Electricity—Two Years

Anthony Demitry Belida, North
 Chelmsford
 Francis Joseph Earley, Lowell
 John Joseph Kaslow, Lawrence
 Michael Andrew Keohane, Lowell

Christos Evangelos Mandravelis, Nashua,
 N. H.
 John Edward Ryan, Lowell
 Clifton Archie Varnum, North Andover
 Frederick Joseph Weber, Nashua, N. H.

Practical Electricity—One Year

Louis Joseph Borrelli, Lawrence
 James Francis Concannon, Lawrence
 Hugh Henry Connell, Jr., Methuen
 Leo Joseph Delisle, Lowell
 Edward Everett Gage, Nashua, N. H.
 Michael Daniel Grieco, Lawrence

Nicholas Khoury, Methuen
 John Joseph Mulcahy, Lawrence
 David Frank Paquette, Lawrence
 Alfred George Rindler, Lowell
 George Harry Seavers, Methuen

Machine Shop Practice—Two Years

Joseph Alphonse Belanger, Nashua, N. H.	George Christopher O'Brien, Lowell
Leslie Deaquilla Binks, Hudson, N. H.	Edmond Louis St. Onge, Lowell
Ernest Wilfred Desrochers, Amesbury	George Alfred St. Onge, Lowell
Francis William Hogan, Lowell	

Mechanics—One Year

Richard Erwin Hanson, Graniteville	Paul Eustace O'Brien, Lowell
Carl Benjamin Laidlaw, Lowell	William Lawrence Peterson, Lowell
Donald McKeown, North Billerica	Francis Philip Trowbridge, Lowell

Selling and Advertising—One Year

Claire Leona Blodgett, Methuen	Caroline Frances Kus, Lowell
William Albert Bue, Lawrence	Bancroft Francis McPherson, Lowell
Norman Eugene Crossman, Lawrence	Frederick Leonard McNulty, Lawrence
James Hamilton, Lawrence	John Paul Mauceri, Lawrence
Ralph Ephraim Holt, Lawrence	Harold Trueman Moore, Lawrence
Elizabeth Bernice Keleshian, Lawrence	Edmond Ramey, Lawrence
Herbert Herman Krauss, Lawrence	John Harold Rogers, Lowell

Air Conditioning—One Year

Richard Ashton, Lawrence	Chester Arthur Merriam, Lawrence
George Wotton Heasman, Lowell	Alfred Wallace Roberts, Jr., Lawrence
Charles John Hondras, Lowell	Frank Joseph Shore, Lowell
Robert Leonard Judge, Lawrence	

Shop Mathematics—One Year

Lloyd James Aspinall, Lowell	Benjamin Robert Geoffroy, Lowell
Robert Leo Beauregard, Lowell	Warren William Godfrey, Haverhill
Stephen Jacob Britko, North Chelmsford	Thomas Henry Kenney, Lowell
Francis Patrick Clark, Lowell	Harold Vincent Lloyd, North Billerica
Raymond Elgin Emmert, Lawrence	Ernest Clifford Melnerney, Lowell
Norman Fasth, Lowell	Roger Romeo Monbleau, Lowell
Albert Hollingsworth Forty, Graniteville	Daryl Victor Pleshaw, Methuen
Harvey Gauthier, Lowell	Joseph Leo Vallee, Lowell

Diesel Engines—One Year

Robert Wade Barris, Chelmsford	Rene Girard Paquette, Lowell
Warren Douglas Hall, Methuen	Louis Vincent Pekarski, Lawrence
Albert Edward Hankinson, Lowell	John Joseph Walsh, Lawrence
Steadman Franklin Humphrey, Westford	Gerald Joseph Wayne, Lowell
Arthur Joseph Lambert, Lowell	

Mathematics—Two Years

Charles Constantine Anton, Lowell	Warren Frederick Kunz, Lowell
Malcolm Oswald Bennert, Andover	Francis Jerome Mahoney, Lawrence
Frederick Paul Bohne, Methuen	Nicholas Moskovites, Lowell
Edward James Desmarais, Nashua, N. H.	Robert Joseph Patterson, Lawrence
Wilfrid Georges Desrosiers, Lowell	Edward Arthur Prince, Haverhill

Elementary Chemistry—Two Years

Hector Albert Drainville, Lowell	Charles Henry Redman, Lowell
James Falcon, Jr., Methuen	Walter Warren Robbins, Hopkinton
Irving Wyman Feyler, Chelmsford	Paul Norman Robillard, Lowell
James Joseph Gordon, Lawrence	Earle Prescott Shepard, Lowell
Oscar Hans Hansen, Lowell	David Millar Sutherland, East Chelmsford
Thomas Richard Hart, Lowell	Joseph Edward Weldon, Lowell
Ernest Wray Nutter, Lawrence	Peter Yuknewicz, Jr., Nashua, N. H.
Santo Alfred Pistorio, Lawrence	

Analytical Chemistry—Three Years

Albert Emile Bergeron, Haverhill
Edward Camara, Lowell

Sylvio Arthur Pilato, Lowell
Walter Herbert Wahlen, Cambridge

Textile Chemistry and Dyeing—Three Years

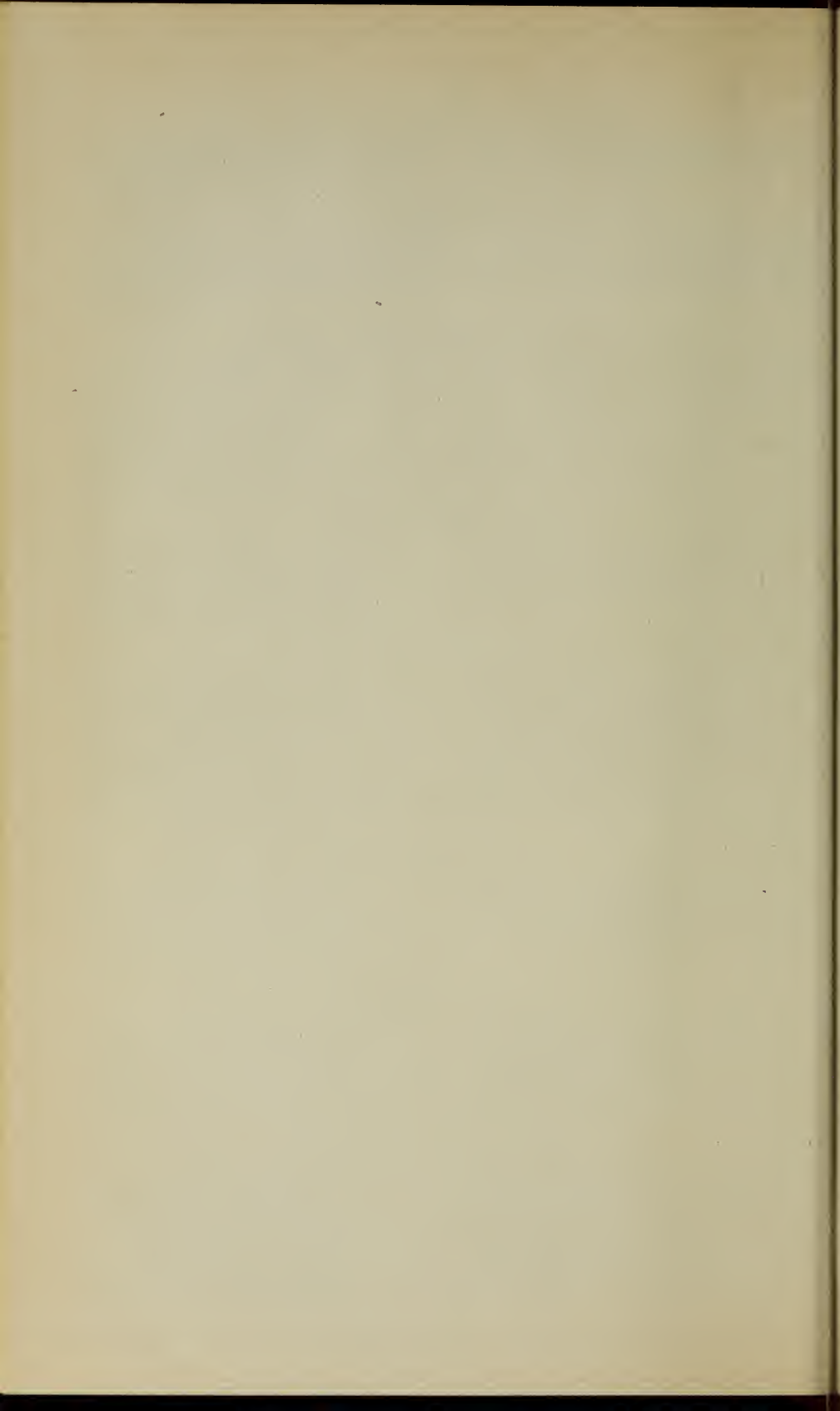
Elmer Collier, Chelsea
Henry Arthur Gatterman, Mattapan
Walter Ginsburg, Allston
Thomas Hadfield, Methuen

Warren Franklyn Halstead, Methuen
William Bolis Kaupin, Lawrence
Joseph Batty Wilkinson, Lawrence
Joseph Peter Willan, Lawrence

Chemistry and Technology of Leather—One Year

George McDonnell Cochrane, Marblehead
Wilbur Joseph Peterson, Peabody

James Francis Quinn, Salem
James Francis Ward, Peabody



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Moody Street and Colonial Avenue

A SURVEY OF THE TEXTILE PURCHASING PROCEDURES EMPLOYED BY RETAIL OUTLETS

by

CHARLES F. EDLUND, S.B., Ed.M.

Assistant Professor of Sales Engineering, Lowell Textile Institute

The following paper is based on a thesis prepared by Morton L. Oppenheim as a requirement for the degree of B.T.E. at the Lowell Textile Institute.

INTRODUCTION. Each year several billion yards of textiles in the form of yard goods and various garments are sold to the public through some 200,000 dry goods, department, specialty and other stores. Years ago when retailing enterprises were for the most part small and before the rise of the ready-to-wear industry manufacturers of textiles sold in large lots to a number of so-called national wholesalers. These wholesalers contacted the retailers, who as a rule bought in large lots, even a year's supply at a time. The typical practice was for the retailer to visit the textile market where these wholesalers were located, usually such cities as New York, Chicago or St. Louis. After visiting several wholesalers the retailer would buy his requirements for the coming season.

Later, as competition became more intense and the methods of transportation more developed, drummers or traveling salesmen were sent out to secure orders. This resulted in retailers buying in smaller lots and often from a larger number of wholesalers. Selling or marketing costs increased and wholesalers established many branch offices throughout the country.

Recent years, especially since the first World War, have seen a marked decline in the importance of the wholesaler in the textile field and a considerable revision in the manner of textile distribution. Several factors have influenced this. One is the rise of the ready-to-wear industry, which is located predominantly in New York City. Second is the rise of large scale retail enterprises such as department and chain stores. Third is the increasing importance of fashion which requires smaller lots and faster distribution to avoid style obsolescence.

Two new intermediaries have come into being since the first World War, the resident buyer and the buying syndicate. These have greatly reduced the necessity for wholesalers. The resident buyer is a firm located in the marketing center, which for a fee keeps the retail stores located outside the center informed as to price and style changes. It makes purchases as directed and assists the store buyer on trips to the central market to secure the most advantageous buys.

The buying syndicate is an association of stores who pool a large part of their purchases to secure price discounts, exclusive material and other concessions. They usually set up an office in the marketing center and do their buying, both pool and individual, with its aid.

The purpose of the survey reported below was to discover to what extent the buying of textile material by various types of stores has changed and what were the current practices employed by the various types of retail outlets for textiles. A selected group of stores representing each type were interviewed and their buying practices recorded as outlined below.

INDEPENDENT DEPARTMENT STORE. Virtually all stores of this type make wide use of the resident buyer. Considering the departments handling piece and yard goods, the wholesaler still accounts for approximately 20% of the merchandise carried. The greatest asset of the resident buyer in this case is the information received from him regarding style and prices. Drummers are still of some importance, especially in stores located a great distance from New York and other textile centers.

In the departments carrying women's wear or lines of merchandise sharply affected by style the resident buyer is of tremendous importance both as a buying medium and as an information center. Depending upon the location of the store upward of 50% of the stock may be ordered through the New York office. Practically all the merchandise comes direct from the manufacturer with the possible exception of cheap cotton dresses and house coats which are often bought from wholesalers. Drummers still figure as a medium through which orders are placed although buying trips to New York plus the resident buyer's work account for most of these styled items.

In the men's wear field practically all merchandise is bought direct from the manufacturer either through drummers, who are still important in this field, or on buying visits to the market. Stores located a long distance from the market make considerable use of the resident buyer due to the difficulty of visiting the central market.

In departments handling household products the resident buyer is becoming more and more important. His ability to obtain quantity discounts and exclusive rights to material explain why in some instances he accounts for 50% of the stock carried. Most of the merchandise is bought direct from the manufacturer although in certain lines the wholesaler is still a factor. In many cases the drummer is completely out of the picture as orders are handled by mail or some other medium.

The use of the resident buyer, wholesaler, direct purchases from manufacturer and the drummer representing either the wholesaler or the manufacturer varies considerably between stores depending on size, location and the lines carried. On the average probably 30% to 50% of the stock of the independent department store is bought through the resident buyer. On all goods purchased, whether by resident buyer or not, about 75% come direct from the manufacturer and the remainder from wholesalers.

SYNDICATE DEPARTMENT STORE. These stores are similar to the independent department store except that they make little use of the resident buyer but use instead a buying syndicate which is owned cooperatively by the member stores. From 10% to 15% of their stock is purchased on a pooled basis. This applies primarily to staple items. Approximately 50% to 60% of all merchandise carried is, however, ordered through the syndicate office. The remainder is bought by the individual store buyers on buying trips to the market and to a lesser extent from wholesalers or drummers. Nearly all piece goods and household products are bought through the syndicate. Due to local differences in fashion, less women's wear is bought by the syndicate than any of the other lines.

CHAIN DEPARTMENT STORE. These stores are centrally owned and the buying is usually done centrally as well. A buying office for all stores of the chain functions in the marketing centers and secures all merchandise except perhaps for a 5% to 10% leeway allowed the local store manager to meet local preferences and competition. The central office buys direct from manufacturers in the great majority of the cases. The wholesaler is used only when a better bargain can be obtained by that means. In some instances such chains have even gone into manufacturing on certain staple items.

MEN'S SPECIALTY CHAIN. These are chains of stores specializing in men's wear and they have become increasingly important in recent years. Almost invariably they buy fabric and either cut it themselves or have it cut on commission. They are usually large and buy their fabrics direct from the mill. A central office buys any other items the stores may need to round out their line of men's furnishings.

WOMEN'S SPECIALTY CHAIN. Due to the importance of fashion in this field, chains have not been too successful. Each locality differs and the public's demand for variety makes central purchasing or quantity buying difficult if not impossible. Millinery, hosiery and foundation garment chains have enjoyed a greater success than the regular women's specialty shop. In such cases buying is done centrally or the chain is manufacturer owned.

INDEPENDENT MEN'S SPECIALTY STORE. The clothing wholesaler has been virtually eliminated from this field and a direct relationship exists between the garment manufacturer and the retailer. The owner or manager of these stores usually buys more than 50% of the stock on his periodic visits to the market. The rest of the merchandise is bought from drummers representing a variety of manufacturers. There is a marked tendency for the retailer to eliminate the drummer and become a so-called "house account", that is, to do business with one manufacturer whether on buying trips or through the mails. It facilitates fill-ins and reorders and eliminates the cost of the drummer. Exclusive agencies amounting almost to chains are also common in this field. A small amount of such items as hosiery and underwear are purchased from wholesalers. Generally it is less than 10%.

INDEPENDENT WOMEN'S SPECIALTY STORE. Here, also, the wholesaler has been virtually eliminated except in some instances of cheap cotton house dresses. The

resident buyer becomes a prime necessity to aid the buyer in keeping this stock up to date. Only those stores near enough to the market center so that the buyer may make several trips a week to inspect new lines and styles could dispense with the advice given by the resident buyer. Stores using the resident buyer purchase approximately 80% of their stock through his office.

INDEPENDENT DRY GOODS STORE. A "dry goods store" is one specializing in piece goods, sheets, draperies, towels, blankets, curtains, etc., plus usually underwear, some outerwear, and furnishings. These stores are, in general, small and it is in this field that the old line wholesaler still is a powerful factor. Such stores buy in small lots and cannot usually buy direct. This is especially true of stores located far from the marketing center. The wholesaler usually contacts the dry goods store by a drummer but considerable business is done by mail as well as the buyer's trip to the marketing center.

CONCLUSION. We may therefore conclude that the wholesaler continues to decline in importance in the textile distribution field although in a few lines he is still a factor. In general, retailers that handle a wide variety of staple goods and who must buy in small quantities work through wholesalers rather than producers. Retailers that handle specialty goods or goods with a rapid style obsolescence find it better to work direct with the producer and the widespread and increasing use of the resident buyer and buying syndicate make this possible even for small retailers. Large retailers buy in such quantity that they find it advantageous to assume some of the wholesaler's function and buy direct.

BULLETIN

of the

Lowell Textile Institute

LOWELL, MASS.

Issued Quarterly

1942-1943

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under Act of Congress of July 16, 1894

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Act of October 3, 1917, authorized October 21, 1918

Moody Street and Colonial Avenue

A STUDY OF THE EFFECT OF TWIST UPON THE CONTRACTION IN SINGLE CARDED YARNS

By ARTHUR J. WOODBURY, Department of Cotton Yarns and Knitting,
Lowell Textile Institute

(This bulletin is a brief resume of part of a study conducted by the author and Mr. Ralph P. Webb, a senior student, and any criticisms or suggestions for future study will be appreciated.)

The purpose of this project was to study the effect of twist upon the contraction in a group of single carded yarns.

The work was carried out on a group of single carded yarns made from 1 1/16 inch Middling Texas Upland cotton. The counts of the yarns ranged from 12 to 29.25 inclusive with a range of twists for each number calculated with a range of twist multipliers from 3.00 to 6.00 inclusive by half number increments. All the yarns were spun from single roving on frames equipped with long draft and tape driven spindles.

The study involved a comparison between the measured length of stock delivered from the front roll and the length of yarn wound upon the bobbin. The method of determining the actual length delivered by the front roll was to feed a two ply commercial knitting yarn, of about the same thickness as the ribbon of roving, through the nip of the front rolls and to allow this yarn to wind around the scavenger roll. During the spinning operation, the odd numbered bosses along one side of the frame spun the yarn while the even numbered bosses delivered the two ply measuring yarn.

For each different twist of each number, an effort was made to secure 120 yards of yarn on each of the bobbins of the 18 spindles that were producing yarn. At the beginning and end of each test run, all the strands, of both the spun yarns and the measuring yarns, were marked by an ink spot directly in front of the front roll. At the end of each run, both the spun yarn and the measuring yarn delivered by the same top roll were reeled upon a cotton yarn reel and measured. Care was used to keep the tension in each yarn uniform throughout the reeling. The length was measured to the nearest half inch.

Summary

Contraction in percent

Nominal Yarn No.	Twist Multiplier						
	3.00	3.50	4.00	4.50	5.00	5.50	6.00
12.00	5.02	5.46	6.72	9.11	10.70	12.60	14.75
14.25	4.38	4.17	6.96	8.75	11.24	12.38	14.52
17.00	3.98	4.85	6.18	6.97	9.30	10.56	13.33
20.50	3.02	4.96	6.29	8.41	8.81	10.48	14.75
24.50	2.56	3.70	4.72	5.66	7.34	9.28	10.20
29.25	2.98	4.08	5.26	6.44	8.40	8.85	10.29

The above table shows a summary of the results obtained. Each figure in each twist multiplier column indicates the average percent contraction for that twist for the nominal yarn number in the column at the left. The nominal yarn number or standard count was the size for which the draft of the frame was set as close as was obtainable with the draft gears for the frame. This standard count was spun when using a twist gear calculated for a 4.50 twist multiplier. The draft for each standard count was maintained at this figure for all the other tests on that count.

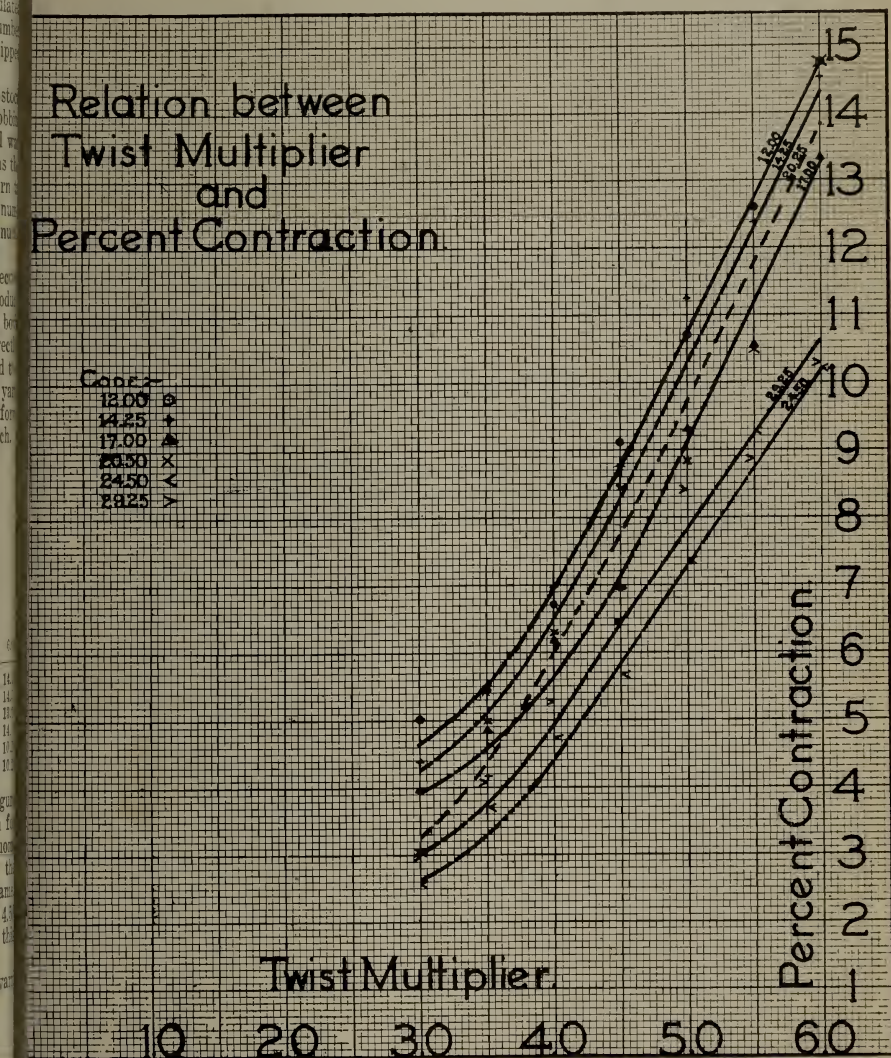
The calculated percent contraction for any twist multiplier and yarn number was determined as follows:—

average length of measuring yarn — average length of spun yarn (100) =
 average length of measuring yarn

percent contraction.

The accompanying family of curves shows:—

- (1) That the contraction increases as the twist multiplier is increased,
- (2) That the slope of the curve is less for low twist multipliers than for high twist multipliers,
- (3) That the coarser the yarn, or the greater the number of fibres in a cross sectional area, the more rapid the rate of change in contraction.



The following equation will give an approximate contraction for count within the range of 12 to 30 inclusive made from cotton of this character and staple and having twists calculated within the twist multiplier limits of 3.0 to 6.00 inclusive. For counts between 20 and 30, omit the correction factor (A)(0.015) from the formula.

$$\text{Formula:—Contraction in Percent} = \frac{[K + (A)(0.015)] (M^2)}{\text{cube root of yarn number}}$$

K is a constant, 0.967 for this type of yarn.

A is the number of $\frac{1}{2}$ number increments of twist multiplier above or below 5.00 (plus if above, minus if below).

M is the twist multiplier.

For example:—What is the percent contraction in 13^s filling yarn made with a twist multiplier of 3.50?

$$\text{Percent Contraction} = \frac{[0.967 + (3)(0.015)] (3.50^2)}{\text{cube root of 13}} = 5.28\%$$

What is the percent contraction in a 28^s warp yarn made with a twist multiplier of 4.70? Note: (As this count is between 20 and 30 the correction factor (A)(0.015) is omitted.)

$$\text{Percent Contraction} = \frac{(0.967)(4.70^2)}{\text{cube root of 28}} = 7.04\%$$

This study does not presume to tell the complete story even for yarns of the type tested. More time is needed to check the over laps and back steps such as occurred in the 24.50 and 29.25 counts, and for single yarns in general a great deal more study is needed.

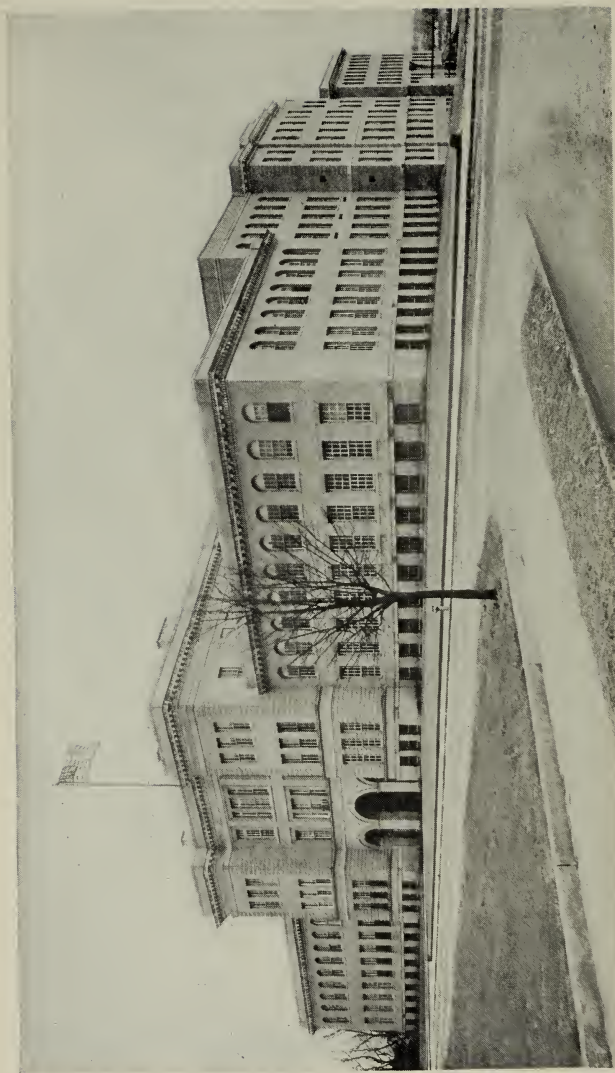
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Louis Pasteur Hall

Southwick Hall

BULLETIN

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Moody Street and Colonial Avenue

CALENDAR

1942-1943

September 8-9, Tuesday-Wednesday . . .	Entrance Examinations
September 8-12, Tuesday-Saturday . . .	Re-examinations
September 10, Thursday, 9.30 A.M. . . .	Registration for Freshmen
September 14, Monday	Registration for upper-class students
	Classes begin for Freshmen
September 15, Tuesday	Classes begin for upper-class students
October 12, Monday	Columbus Day — Holiday
November 11, Wednesday	Armistice Day — Holiday
November 25, Wednesday, 4.00 P.M. . . .	Thanksgiving recess begins
November 30, Monday, 8.30 A.M.	Thanksgiving recess ends
December 18, Friday, 4.00 P.M.	Christmas recess begins
January 4, Monday, 8.30 A.M.	Christmas recess ends
January 11, Monday	First term examinations begin
January 22, Friday	End of first term
January 25, Monday	Second term begins
February 22, Monday	Washington's Birthday — Holiday
April 19, Monday	Patriots' Day — Holiday
April 20, Tuesday	Final examinations begin for seniors
April 23, Friday	Good Friday — no classes
May 4, Tuesday	Commencement
May 10, Monday	Final examinations begin for first, second and third year students
May 30, Friday	Memorial Day — Holiday
June 10-11, Thursday-Friday	Entrance Examinations

1943-1944

September 14-15, Tuesday-Wednesday . .	Entrance Examinations
September 13-18, Monday-Saturday . . .	Re-examinations
September 16, Thursday, 9.30 A.M. . . .	Registration for Freshmen
September 20, Monday	Registration for upper-class students
	Classes begin for Freshmen
September 21, Tuesday	Classes begin for upper-class students
October 12, Tuesday	Columbus Day — Holiday
November 11, Thursday	Armistice Day — Holiday
November 24, Wednesday, 4.00 P.M. . . .	Thanksgiving recess begins
November 29, Monday, 8.50 A.M.	Thanksgiving recess ends
December 17, Friday, 4.00 P.M.	Christmas recess begins
January 3, Monday, 8.50 A.M.	Christmas recess ends
January 17, Monday	First term examinations begin
January 28, Friday	End of first term
January 31, Monday	Second term begins
February 22, Tuesday	Washington's Birthday — Holiday
March 31, Friday, 4.00 P.M.	Spring recess begins
April 10, Monday, 8.50 A.M.	Spring recess ends
April 19, Wednesday	Patriots' Day — Holiday
May 22, Monday	Second term examinations begin
May 30, Tuesday	Memorial Day — Holiday
June 6, Tuesday	Commencement
June 8-9, Thursday-Friday	Entrance Examinations

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HISTORICAL SKETCH of the LOWELL TEXTILE INSTITUTE

By virtue of legislative acts of 1928, the Lowell Textile School became known as the Lowell Textile Institute in order to define more clearly the standing of the institution. This was the natural result of the development of the original ideas and policies of the trustees who founded the Lowell Textile School. The articles of incorporation were authorized by Chapter 475, Acts of 1895, and provided for a corporation to be known as the Trustees of the Lowell Textile School of Lowell, Massachusetts. The movement for the establishment of the school dates from June 1, 1891, but it was not opened for instruction until February 1, 1897.

In accordance with the acts of incorporation the Board of Trustees consisted of twenty permanent and self-perpetuating members, three-fourths of whom must be "actively engaged in, or connected with, textile or kindred manufactures." In addition, his Honor the Lieutenant-Governor, the Commissioner of Education of the State, the mayor, the president of the municipal council, the superintendent of schools of Lowell, and a representative of the textile council were members *ex-officio*. Legislative acts of 1905 and 1906 authorized the graduates of the school to elect four trustees serving for periods of four years each.

By virtue of the anti-aid amendment to the State Constitution, and by Chapter 274, General Acts of 1918, the property of the school was transferred on July 1, 1918, to the Commonwealth of Massachusetts, and the control and management of the school was vested in a Board of Trustees appointed by the Governor, "with all the powers, rights and privileges and subject to all the duties" of the original Board.

In locating the Institute at Lowell, which has been called the "Mother Textile City of America," considerable advantage is secured by close association with every branch of the industry, which utilizes almost every commercial fiber in the products of the great Merrimack Valley textile district.

Although the school was formally opened by Governor Roger Wolcott on January 30, 1897, in rented quarters in the heart of the city, it was not until January, 1903, that the first buildings of the present plant were ready for occupancy. On February 12, 1903, Governor John L. Bates dedicated the present buildings.

PURPOSE AND SCOPE OF THE INSTITUTE

The object of the establishment of the Institute as set forth in the original act was "for the purpose of instruction in the theory and practical art of textile and kindred branches of industry."

The plan was occasioned by the apparent crisis in the leading industry of New England, due to the rapid development of the manufacture of the coarser cotton fabrics in the southern States. It was believed that this crisis could be met only by a wider and more thorough application of the sciences and arts in the production of finer and more varied fabrics.

Following the general methods and systems found successful at the higher polytechnic institutes, it offers thorough instruction in the principles of the sciences and arts applicable to textile and kindred branches of industry. The courses treat not only of the theory but also the application of these principles in the processes, on the machines and throughout all departments of industry involved in the successful manufacture, application and distribution of textile material in any form.

Though from the first the management has kept in view the clearly defined objective which called for the establishment of the Institute, it has developed its curriculum, its methods of instruction, and equipment as the needs of the industry arose. This objective will be kept constantly in view, and as new demands are presented an effort will be made to extend courses, equipment and floor space. The mechanical equipment of the Institute includes the best makes of textile machinery, and these machines, while built as they would be for regular work, are, as far as possible, adapted to the experimental work which is of particular value in such an institution as this.

Because of the breadth, grade and character of instruction given, and because of the standing and personnel of the instructing staff, the Institute has been placed

by both Federal and State educational boards in the class of the higher technological schools of this country.

The United States Civil Service Commission recognizes graduates from the degree courses of this school as proper applicants for the examination to the various positions requiring a knowledge of applied science and engineering, as well as a knowledge of textile manufacturing, in the different departments of the government.

The courses for those students who can attend the day classes are organized to prepare them to enter some one of the various branches of the textile industry. It is required that all such students shall have an educational background equivalent to that of a complete college preparatory course as given by a recognized high school or academy. These textile courses are either of three or four years duration and are described in detail on the following pages of this catalogue.

The evening classes are held for about twenty weeks of the year, and are for those who are unable to attend the day courses. These are similar to the day courses, but are aimed especially to meet the needs of students working during the day in the mills and shops. For entrance to these classes an applicant should have the equivalent of a grammar school education. A detailed description of these courses and requirements is given in another Bulletin, which will be sent upon request.

BUILDINGS AND GROUNDS

The site is a commanding one, consisting of about 15 acres at a high elevation on the west bank of the Merrimack River. It extends to and overlooks the rapids of Pawtucket Falls, which was the first water power in America to be used on an extensive scale to operate power looms. It was contributed by Frederick Fanning Ayer, Esq., of New York City, and the Proprietors of the Locks and Canals on the Merrimack River.

Southwick Hall, the main building, fronting on Moody Street, was contributed by the Commonwealth of Massachusetts and Frederick Fanning Ayer, Esq., and is a memorial to Royal Southwick, a leading textile manufacturer, a public man of earlier days, and a maternal ancestor of Mr. Ayer. It includes a central mass 90 by 90 feet, having three stories and two wings 80 by 85 feet each with two stories and well-lighted basements. The building is pierced in the center by an arched way from which access is had to the wings and to the central courtyard. The northern wing is occupied by the General Offices, Engineering and Finishing Departments, and Library, while the southern wing is occupied by the Chemistry and Dyeing Departments.

Kitson Hall, dedicated to the memory of Richard Kitson, was contributed by Charlotte P. Kitson and Emma K. Stott, his daughters; the Kitson Machine Company of Lowell, founded by Mr. Kitson, was also a generous contributor. This hall makes a right angle with Southwick Hall, is 70 by 183 feet, has two stories and a basement and houses the Cotton Yarn and Knitting Departments, the Mechanical and Electrical Engineering laboratories and the Machine Shop.

The Falmouth Street Building forms the third side of the quadrangle, and consists of three portions, one 60 by 75 feet, three stories, one 75 by 130 feet, three stories, and the head house 70 by 80 feet, three stories and basement. The building is occupied by the picker section of the Cotton Yarn Department, the Design and Power Weaving Department and by the Woolen and Worsted Yarn Department, and contains on the lower floors an equipment for the manufacture of wool yarn from the fleece to the finished yarn. The upper floors are occupied by a great variety of plain, dobby and Jacquard looms, and in a section of the building are the students' lockers and recreation rooms.

Louis Pasteur Hall. By means of a special appropriation made by the Legislature of 1937 a three story addition was placed on a single story building that was previously known as the Colonial Avenue Building which was erected in 1910. This Hall contains on the first floor the Cotton Finishing laboratory with class rooms and offices of the Wool Department. On the upper floors are found the laboratories, class and lecture rooms, library, and research laboratories of the Chemistry and Textile Coloring Department.

CAMPUS

Through the generosity of Mr. Frederick Fanning Ayer the Institute has been provided with a campus and athletic field of about 3 acres. This has been carefully graded and laid out for football and track athletics.

To enclose this field the Alumni Class Fence has been partly built. It is made of forged iron sections supported between brick columns. Each section is contributed by a class, so that in the course of a few years this fence will entirely enclose the field.

In addition to this field there has been developed during the past few years a larger area that was used for baseball for the first time during 1938. This is located northeast of the Institute buildings and will, it is hoped, be further improved to make a modern campus for baseball and other sports.

GENERAL INFORMATION

Application for Admission.—A blank form of application for admission may be found at the end of this bulletin. This should be properly filled out by all applicants, whether entering upon certificate from a secondary school or presenting themselves for examination.

Freshman Registration.—Each freshman is expected to be in daily attendance beginning Thursday, September 16, at 9.30 A.M., and to follow the prepared program which will be placed in his hands. A program which is planned to acquaint the new student with the institution, its location and surroundings, its courses of instruction, its recreational activities and other phases of its life is arranged for the opening week. Unless arrangements for room and board are made previously, the first two days of the week may be used for this purpose. Physical examinations as well as certain other tests are given during this orientation period. Freshman week enables the student to secure the advantages which come from acquaintance with his surroundings, his instructors, the members of his class, student organizations, activities and customs. The overcrowding of the first week of classes with distractions is thus avoided.

Registration.—All upper classmen are required to register on or before the Monday of the week beginning the school year, and all students during the midyear examination period. For unexcused delay in registration a fee of \$5 will be imposed.

Sessions.—The regular school sessions are in general from 8.50 A.M. to 12.20 P.M., and from 1.25 to 4.00 P.M., except Saturdays, when no classes are held. On Saturday afternoons the buildings are closed.

An hour plan designates the hours at which the various classes meet. This is rigidly adhered to, and the student is marked for his attendance and work as therein scheduled.

Attendance.—Attendance is required of all students on fourteen-fifteenths of all scheduled class exercises, provided they meet the requirements of their instructors for the omitted exercises. For every unexcused absence from any class exercise in excess of those allowed, a deduction will be made from the mark obtained in the course in which the absences occurred.

Advisers.—Advisers are appointed for all students, to be of such aid and assistance as they can both inside and outside of school hours. The head of the department in which a student is registered is adviser to upper-classmen, and instructors in charge of freshmen classes act as advisers to freshmen.

Conduct.—Students are required to return to the proper place all instruments or apparatus used in experimental work, and to leave clean and in working order all machinery and apparatus with which they may experiment. All breakages, accidents or irregularities of any kind must be reported immediately to the head of the department or instructor in charge.

Irregular attendance, lack of punctuality, neglect of either school or home work, disorderly or ungentlemanly conduct or general insubordination are considered good and sufficient reasons for the immediate suspension of a student, and a report to the trustees for such action as they deem necessary to take.

It is the aim of the trustees so to administer the discipline of the Institute as to

maintain a high standard of integrity and a scrupulous regard for trust. The attempt of any student to present, as his own, work which he has not performed, or to pass an examination by improper means, is regarded by the trustees as a most serious offense, and renders the offender liable to immediate suspension or expulsion. The aiding or abetting of a student in any dishonesty is also held to be a grave breach of discipline.

Any student who violates these provisions will be immediately suspended by the president, and the case reported at the following meeting of the trustees for action.

Examinations.—For first-year students examinations are held every five weeks, and these serve to inform the student concerning his standing and the progress made. For students in upper classes examinations will be held during the eighth week of each term. Final examinations are held at the end of each term.

In general, the examinations cover the work of the preceding term, but at the discretion of the instructor may include work of earlier terms.

Examinations for students conditioned in first-term subjects are held during the second term, and examinations for students conditioned in the second-term subjects are held in September following.

Any student who fails to complete a subject satisfactorily or to clear a condition at the time appointed, will be required to repeat the subject, and he cannot be admitted to subjects dependent thereon.

A student whose term's standing is as a whole so low that he cannot continue with profit the work of the next term will be required to leave, but he may return the following year to repeat such subjects as are required.

Daily work and regularity of attendance are considered in making up the reports of standing.

Records and Reports of Standing.—During each term informal reports are sent to parents or guardians and to all students; and at the end of each term formal reports are made.

The daily work of the student forms an important part of his record, and no pupil will be awarded the diploma or degree unless this portion of his record is clear.

Books are prescribed for study, for entry of lecture notes and other exercises, and are periodically examined by the lecturers. The care and accuracy with which these books are kept are considered in determining standing.

Library and Reading Room.—That the students may have surroundings conducive to reading and study a moderate-sized reading room with library tables and chairs has been provided. The library shelves contain textile, art, engineering and scientific publications. These are increased from time to time as new technical books of value to textile students are issued from the press. The leading textile papers are kept on file for ready reference.

The Chemistry and Dyeing Department also has a library supplied with books and periodicals which pertain to chemistry in general and textile chemistry and dyeing in particular.

FEES, DEPOSITS, ETC.

Tuition Fee.—The fee for the day course is \$150 per year for residents of Massachusetts. For non-residents the fee is \$250 per year. The fee for students from foreign countries is \$500 per year.

Three-fifths of the fee is charged for a single term. Each term's tuition is payable during the first week of that term. Students failing to make this payment at the specified time will be excused from classes until satisfactory explanation and arrangements for payment can be made. No report of a student's standing will be mailed unless tuition and fees are fully paid. After payment is made no fee or part thereof can be returned, except by special action of the trustees. The above fee includes free admission for any day students desiring to attend any of the evening classes in which there is accommodation.

Special students pay, in general, the full fee, but if a course be taken involving attendance at the school during a limited time, application may be made to the president for a reduction.

Students entering from Massachusetts are required to file with the Bursar a statement signed by either town or city clerk, stating that the applicant's father is a legal resident of Massachusetts.

Athletic Fee.—An athletic fee of \$15 is due and payable at the time of the first payment of tuition.

Deposits.—Students taking chemistry make a deposit of \$25 the first year, and \$25 each term for the second, third and fourth year chemistry course; students taking machine shop are required to make a deposit of \$10. All other students are required to make a deposit of \$10 each year to cover any general breakage.

All deposits must be made before students can be admitted to laboratory work. The unexpended balance of any deposit will be returned at the end of the year to students not otherwise in arrears.

Student Aid.—The Student Work Program under the National Youth Administration for Massachusetts has been carried on during the years that these funds have been available. The average amount earned by each student assigned to a project is approximately ten dollars per month. Applications should be made to the General Office at the Institute.

Rooms and Board.—Students from a distance, requiring rooms and board in the city, may, if they desire, select same from a list which is kept at the Institute. The cost of rooms and board in a good district is \$12 per week and upwards.

Books and Materials.—Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Each student must provide himself with proper outer garments and wear them in such a manner when working in the various laboratories that clothing and person will be protected and not endangered by moving machinery or chemicals.

All raw stock and yarn furnished to the students, and all the productions of the Institute, remain or become its property, except by special arrangement; but each student is allowed to retain specimens of yarn or fabrics that he has produced, if mounted and tabulated in accordance with the requirements of the department. It is understood that the department may retain such specimens of students' work as they may determine.

No books, instruments or other property of the Institute are loaned to the students to be removed from the premises except by special permission.

Summary of Expenses per Year

Tuition (residents of Massachusetts)	\$150
Tuition (residents of other States)	250
Tuition (foreigners)	500
Chemistry laboratory deposit (1st year)	25
Chemistry laboratory deposit (2d, 3d and 4th years)	50
Athletic fee	15
Machine shop deposit	10
General breakage fee	10
(This applies to students who do not take chemistry or machine shop.)	
Books and supplies	50
(Books and supplies for the first year cost about \$80, second and third year \$35, and fourth year \$50, thus averaging about \$50 per year for the four years.)	

ENTRANCE REQUIREMENTS

Particular stress should be laid upon a thorough grounding in mathematics, including algebra, arithmetic and plane geometry, as these form the basis upon which the work of this school rests. While solid geometry is not required at the present time, the student will find a knowledge of this subject very valuable in his subsequent work, and is strongly recommended to include this subject as one of his electives. A preliminary course in science, including physics and chemistry, serves to prepare the student's mind for the higher branches of these subjects and their application, but neither will be considered as the equivalent of the courses in these branches given in the Institute.

Degree Courses

Candidates for admission to either of the degree courses must be graduates of a school approved by the New England College Entrance Certificate Board or by the Board of Regents of New York, and must present a certificate from the principal of the school last attended, reporting upon the subjects pursued and the points obtained according to the schedule of studies given hereafter. A total of fifteen points is required.

A point represents satisfactory work in a year's study in a specified subject in an approved secondary school.

Required Subjects

Algebra A1	1
Algebra A2	1
English	4
Language other than English	2
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 12

Elective Subjects

	Points
Elementary French (two years) or Elementary German (two years) }	2
Advanced French or German (one year in addition to requirements of Elementary French A or Elementary German A)	1
History:	
American	1
Medieval and Modern	1
English	1
Latin	1
Mechanical Drawing	1
Mechanic Arts	1
Solid Geometry	1
Spanish	1
Trigonometry	1

An applicant may also be admitted on the basis of entrance examinations, in which case he must pass a sufficient number of the required subjects to make eleven points and present certificates showing satisfactory courses in such of the elective subjects to make four additional points.

The objective of the elective requirements is to encourage greater breadth of preparation than that covered by the required branches. Certificates covering other subjects than those listed as elective will be entertained.

Diploma Courses

Candidates for admission to the diploma courses are accepted upon presentation of properly vouched certificates showing the completion of a regular four-year course in a high school or academy of reputable standing. The certificate must specify that the applicant has satisfactorily passed the required subjects.

A total of thirteen points is required.

Required Subjects

	Points
Algebra A1	1
Algebra A2	1
English	4
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 10

Elective Subjects

Four may be selected from the list under Degree Courses.

ENTRANCE EXAMINATIONS

All students who are unable to present a certificate for either the degree or the diploma courses must pass entrance examinations. Notification of intention to take these examinations must be made in writing at least a week before the date of the examinations. These will be held as follows:—

Thursday, June 10, 1943; Tuesday, September 14, 1943; Thursday, June 8, 1944:—

Algebra, 9 A.M. to 11 A.M.

History, 11 A.M. to 1 P.M.

English, 2 P.M. to 4 P.M.

Friday, June 11, 1943; Wednesday, September 15, 1943; Friday, June 9, 1944:—

Plane Geometry, 9 A.M. to 11 A.M.

German or French, 11 A.M. to 1 P.M.

Chemistry, 11 A.M. to 1 P.M.

Physics, 2 P.M. to 4 P.M.

Candidates failing to pass the June examinations are allowed to try again in September; those who cannot attend the June examinations may present themselves in September.

REQUIRED SUBJECTS FOR ENTRANCE

Algebra A1.—Derivation and use of simple formulas, graphical representation, the meaning and use of negative numbers, linear equations, with one or two unknown quantities, ratio and proportion, the essentials of algebraic technique, simple cases of exponents and radicals.

Algebra A2.—Numerical and literal quadratic equations in one unknown quantity, the binomial theorem for positive integral exponents, arithmetic and geometric series, simultaneous linear equations in three unknown quantities, simultaneous equations consisting of one quadratic and including graphical solutions, exponents and radicals.

Plane Geometry.—The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures, the circle and the measurement of angles, similar polygons, areas, regular polygons, and the measurement of the circle. The solution of original problems and problems in mensuration of lines and plane surfaces.

Chemistry.—Requirements are those of the New England College Entrance Board, or the Board of Regents of New York, including personal laboratory work. Those not meeting the requirements by school or college certificate will be subject to written examination.

English.—As secondary schools are following to a greater extent than heretofore the requirements of the College Entrance Examination Board, it is recommended that the applicant to this school conform to the suggestions of this Board relative to English composition and literature.

The examination consists of two parts, both of which are given at the same time.

(a) With the object of testing the student's ability to express his thoughts in writing clearly and correctly he will be required to write upon subjects familiar to him. Emphasis will be laid upon the composition, punctuation, grammar, idiom and formation of paragraphs. He will be judged by how well he writes rather than by how much he writes.

(b) The second part of the examination is prepared with the view of ascertaining the extent of the student's knowledge of good literature, and to test this examination questions will be based on the books adopted by the National Conference on Uniform Entrance Requirements. Any course of equivalent amount if made up of standard works will be accepted.

History.—Applicants may offer a preparation of American history, English history, or medieval and modern history.

In American history applicants should be familiar with the early settlements in America, the colonies, their government, the customs of the people, and events which led to the establishment of the United States. They should be informed concerning the causes and effects of the principal wars in which the country has been involved. They should be prepared to consider also questions requiring an elementary knowledge of civil government, as well as historical facts connected with the growth of this country up to the present time.

For the subject of English history or medieval and modern history the course given in any reputable secondary school should give proper preparation. A course extending over a full year with not less than three periods a week will be accepted.

Physics.—The applicant should be familiar with the fundamental principles of physics, particularly those considered under the headings of mechanics, heat, light, electricity and magnetism. Textbook instruction should be supplemented by lecture table experiments. Wherever possible, the student should pursue a laboratory course, but for the present no applicant will be conditioned in this subject if he has not been able to carry on a laboratory course. Where a laboratory course is offered by a secondary school, it should cover at least twenty-five of those experiments listed in the syllabus of the College Entrance Examination Board.

Modern Languages.—Required for degree courses only. It is expected that the work in these subjects has covered a period of at least two years of preparatory school training or the equivalent. Importance should be given to the ability to translate into good idiomatic English, but attention should also be paid to grammar and construction, that greater care may be used in translation.

Elementary German A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple German prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into German.

The requirements include the declension of articles, adjectives, pronouns and nouns; the conjugation and inflection of weak and strong verbs; the simpler uses of the subjunctive; the use of the modal auxiliaries; the prepositions and their uses; the principal parts of important verbs; and the elementary rules of syntax and word order.

Texts used in the language courses of any reputable high or preparatory school will furnish reading for translation. A list of texts is offered by the College Entrance Examination Board.

Elementary French A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple French prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into French.

The requirements include the principal parts, conjugation and inflection of the regular and the more common irregular verbs; the singular and plural forms of nouns and adjectives; the uses of articles and partitive construction; the forms and positions of personal pronouns; and the simpler uses of the conditional and subjunctive.

Suitable texts are suggested by the language courses of any reputable high or preparatory school and by the requirements of the College Entrance Examination Board.

Students who have pursued two years of elementary French as well as two years of elementary German may present one subject to cover two points in the required subjects, and the other to cover two points in the elective subjects.

ELECTIVE SUBJECTS

History.—If the applicant can present all three or any two branches of history specified he may include one as a required subject and the others in the list of elective subjects.

Solid Geometry.—The usual theorems and constructions of good textbooks, including the relations of planes and lines in space, the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangles. The solution of original problems and the applications of the mensuration of surfaces and solids.

Trigonometry.—The usual courses of instruction covered by the standard textbooks on plane and spherical trigonometry will prepare an applicant sufficiently to meet this requirement.

Mechanical Drawing.—The applicant must have pursued such a course in mechanical drawing that he will be familiar with the usual geometrical construction problems, projection of points, lines, planes and simple solids.

Importance is laid not only upon the accuracy with which the work is performed, but upon the general arrangement, appearance and care with which the plates are executed.

It should not be understood that work in this subject may be offered as the equivalent of the first term's work at the Institute.

Mechanics Arts.—The usual courses offered by properly equipped preparatory schools will be accepted as suitable fulfilment of this requirement. Work should include instruction in the handling of both wood and metal working tools in the more simple practices of these arts.

Elementary French B.—Applicants who enter for one of the three-year courses may present one year's work in French in a secondary school. Those who present themselves for examination in this subject should be familiar with the rudiments of grammar, and be able to translate simple French prose into good idiomatic English, also to translate into French English sentences, based on the French given for translation.

Elementary German B.—Applicants who enter for one of the three-year courses may present one year's work in German in a secondary school. What is stated in regard to French applies to those who may present German instead of French.

Advanced French or German.—In cases where applicants have pursued courses in French or German for more than two years, and have completed work which is more advanced than is included under elementary French or German, they may offer the additional year as an elective.

Spanish.—Students offering Spanish should be familiar with elementary grammar, the common irregular verbs, and be able to translate simple Spanish to English or English to Spanish. A preparation equivalent to three periods per week for two years will be acceptable.

Latin.—Students who have pursued one or more years of Latin may present this subject as an elective. Each year's work satisfactorily completed will be considered equal to one point.

ADVANCED STANDING

Candidates who may have received previous training in any of the subjects scheduled in the regular course will, upon presentation of acceptable certificates, be given credit for such work.

COURSES OF INSTRUCTION

Degree Courses.—The four-year degree courses are as follows:

Textile Engineering.

Chemistry and Textile Coloring.

At the completion of these courses the degrees of Bachelor of Textile Engineering (B.T.E.) and Bachelor of Textile Chemistry (B.T.C.) are conferred.

Five options are offered in the Engineering Course, viz., general textile, cotton manufacturing, wool manufacturing, design, or sales option. Each of these courses is planned to train one in the fundamental principles of science found to be applicable in the particular fields of textile chemistry and textile engineering. It is maintained that for one to be successful in either of these important branches of industry a training is required as thorough and broad as that of any of the recognized branches of engineering or of applied science.

With this in mind these courses have been built of a secure framework of science and mathematics, and to it has been added the useful application of these branches in the broad textile field. With the direct purpose of laying a secure foundation in the training, a more extended preparatory course is first demanded, and subsequently in the school work more subjects of a general character are included, that narrowness of judgment and observation may not result by overstimulation of the technical development.

Diploma Courses.—The following courses extend over a period of three years and upon the completion of any one of these the diploma of the Institute is awarded:
 Cotton Manufacture.
 Wool Manufacture.
 Textile Design.

These are the original courses offered at the Institute, arranged to require three years' study and to give the student as thorough a training as possible for his chosen field, stressing particularly the study of textiles.

COURSES FOR WOMEN

Within the last few years the possibilities for women in certain branches of the textile field have become recognized and it is believed that in the future the positions open to them will become more and more numerous. Although all classes are open to women, the subject of textile design is especially interesting to some who choose the Textile Engineering Course with the design option, for it offers a broad training that prepares for many lines of activity. For those who wish to specialize in art and textile designing in their general application, courses will be arranged as far as the facilities of the Institute will permit. Some are interested in textile chemistry and pursue the Chemistry and Textile Coloring Course. These courses lead to positions either in mill offices or in some commercial lines which are desirable and offer congenial work.

GRADUATE COURSES

By act of the General Court of 1935, authority was given to the Lowell Textile Institute to confer degrees of Master of Science in Textile Chemistry and Master of Science in Textile Engineering to graduate students who satisfactorily complete courses of advanced standing.

The object of the courses is to offer to properly qualified graduates of the Institute who hold bachelor degrees an opportunity to pursue advanced courses in their respective department and to take work in other departments. It is also the object to offer to properly qualified graduates holding bachelor degrees of other institutions of higher learning an opportunity to carry on courses in textile education that will prepare them for entrance to that industry.

Graduates of this Institute will be required to devote at least one year residential study and graduates in general of other institutions at least two years residential study in order to receive the Master degree. Admission to advanced standing may be permitted where the applicant can present work which is approved by the department head as equivalent.

The tuition fees and deposits for graduate students are the same as those required for undergraduates. In general a graduate of this Institute shall devote approximately one third of his course to subjects of advanced character in his own department. One third of his course may be in subjects of his own or other departments not taken in undergraduate work and the remaining third of his course shall be occupied in a thesis of an advanced character and approved by the head of the department.

The courses of study for graduates of other colleges and technological institutions cannot be prescribed in detail for the reason that the selection must depend upon previous scholastic work and standing. They must include the essential subjects of textile education required in the particular department which the applicant elects and must receive the approval of the department head as well as the President and Faculty.

Students with proper preparation may be admitted to advanced courses but cannot be candidates for degrees unless they fulfill the above described requirements. All courses both undergraduate and graduate are open to women.

PHYSICAL EDUCATION AND ATHLETICS

Through competition in athletics and through instruction in classes in physical education the Department of Physical Education attempts to balance the intellectual and mental progress of the students by developing proper health habits, by promoting better physical development, and by inspiring high ideals of sportsmanship.

Physical education and athletics are under the supervision of the Head of the Physical Education Department, who is also Faculty Director of Athletics.

Physical Education

All members of the freshman class are required to take a course in physical training conducted in the gymnasium under the direction of an instructor in physical education. Two periods per week for the entire first year are devoted to this work. At the beginning of the year a full record is made of the physical examinations carried on by the instructor and a reputable physician that proper and beneficial exercise may be prescribed.

The object is to give general instruction in the care and strengthening of the body, and to so guide the students that they may continue to give proper thought to their physical training that their mental development may have its greatest effect.

Proper gymnasium clothing is required and all students must take a shower bath following each exercise.

Athletic Association

All students, by virtue of payment of the student athletic tax, are members of the Athletic Association and are represented by an executive council of sixteen, consisting of the president and athletic representative from each of the four classes, the captains and managers of the three varsity sports, and one representative each from the Pickout and the Textile Players. This Council acts as an advisory body to the Athletic Director, has charge of social and athletic events run by the Athletic Association, and ratifies the awarding of letters and appointment of student managers in the various sports.

The schedules of all sports are arranged with the interest of both the Institute and the individual members of the teams in mind. Admission to all home contests is included in the athletic fee which is paid by each student at the time of registration.

Teams are regularly maintained in varsity football, basketball, and baseball. Recently Textile has been represented by tennis and golf teams and by a junior varsity basketball team. Intramural competition is provided by interclass and interfraternity competition.

SUBJECTS OF INSTRUCTION

In the column headed "Hours of Exercise" the numbers represent for each particular subject the total hours required in school for a period of fifteen weeks.

The letter and number which follow the subjects indicate the department in which the subject is given and the number of the subject in that department. For detailed description of the same, see page 32.

The departments are indicated as follows:—

Textile Engineering	B	Cotton Yarns and Knitting	F
Chemistry and Textile Coloring	C	Woolen and Worsted Yarns	G
Textile Design and Power Weaving	D	Finishing	H
Languages and History	E		

By referring to the letter and number indicated under "Preparation" the student can ascertain what subjects are necessary in order that he may have a clear understanding of the subject which he is scheduled to take.

FIRST YEAR

First Term

(Common to all Courses)

	Hours of Exercise
Elementary Inorganic Chemistry C-10	105
English E-10	45
Mathematics B-10	60
Mechanical Drawing B-13	135
Physics B-11	75
Physical Education	30
Textile Design and Cloth Analysis D-10	75

Second Term

	Course IV	Course VI
Elementary Inorganic Chemistry C-10	30	30
Elementary Organic Chemistry C-11	45	45
Elementary German E-11	30	—
English E-10	45	45
Machine Drawing B-13 or B-13a	45	120
Mathematics B-10	75	75
Mechanism B-12	60	60
Physical Education	45	45
Qualitative Analysis C-12 or C-12a	120	45
Stoichiometry C-13	30	—
Textile Design and Cloth Analysis D-10	—	60

For second-term subjects in Courses I, II, and III, see pages 19, 21, 23.

Course I.—Cotton Manufacture

The Cotton Manufacturing Course is intended for students contemplating a career in the manufacture of yarns or fabrics of cotton or the new synthetics processed after the methods used for cotton. As over eighty per cent of the textile fibers consumed in the United States is cotton, it is the policy of the Cotton Department to give the student a thorough course of instruction in handling cotton first. Later, the adaptation of cotton machinery to handle rayon, wool or other fibers is carefully covered. Throughout the work on cotton carding and spinning, reference is made to the possibilities of handling the various rayons, wools or mixes and usually one or more small lots are processed in the laboratory.

During the first term the studies are common to all courses, and include instruction in mathematics, mechanical drawing, physics, textile design and elementary chemistry.

During the second term, lectures in organic chemistry are given followed by lectures in textile chemistry and dyeing the second year. The work in mechanism serves as a basis for all future machine and mechanical work, and is followed by steam engineering, electricity and mill engineering. The course in textile designing, cloth analysis and cloth construction includes lectures on plain, fancy and Jacquard weaves, the analysis of all commercial fabrics, and designs for the same.

The instruction in cotton carding given in the second year covers the production of cotton throughout the world, the classing of various cottons and the various methods of marketing the cotton crop with particular emphasis given to the American cotton crop. The treatment of cotton in the mill processes covers all the operations preparatory to spinning, for the regular cotton system and for the cotton waste systems. Lectures supplement the material available in specially prepared text books. This makes possible instruction regarding the very newest developments in the industry as well as for standard methods and equipment. Considerable time is spent in the laboratory studying cotton fibers, classing, processing stock and making various tests on the adjustment of machines and the effect on the quality of the work produced.

The third year's work continues that of the second year, with detailed study of spinning, spooling, twisting and winding. Another course gives instruction in mill organization, balancing and arranging machinery in the mill. Finally, a brief course is given in the use of the microscope and camera in studying various problems in cotton manufacture. Laboratory practice supplements the lecture course, giving practical operation, adjustment and observation of the machines studied. Advanced laboratory work illustrates the methods of study and analysis of the more general and complex problems such as are usually handled in the laboratory of a textile plant.

Power weaving is taken up during the second and third years. Commencing with lectures and practice upon plain looms, the instruction continues with dobby, box-loom, and Jacquard weaving.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines. Instruction in the finishing of cotton fabrics is given by lectures and laboratory work, and requires considerable work on standard machines in the laboratory. Textile testing, also given in the third year, instructs the student in standard methods for physical testing of textile material.

During both the second and third years, particular attention is given to the preparation of the various reports in order that the student may learn proper methods for presenting data and conclusions resulting from mill studies and tests.

During the third year, each student makes some original study, usually of a technical nature. He must make a formal report of this study satisfactory to the faculty before receiving his diploma.

For detailed description of the subjects see page 32.

Course I.—Cotton Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	45
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	120	Textile Design and Cloth Analysis D-10	60
Mathematics B-10	75		

SECOND YEAR. FIRST TERM

Color D-33	15	Steam Engineering B-24	45
Cotton Carding F-20	195	Textile Chemistry and Dyeing Lect. C-20	30
Cottons F-22	15	Textile Design and Cloth Construction D-20	90
Physics B-23a	60		
Power Weaving D-24	75		

SECOND YEAR. SECOND TERM

Cotton Carding F-21	165	Textile Chemistry and Dyeing Lect. C-20	30
Cotton Waste Processing F-23	30	Textile Design and Cloth Construction D-20	60
Physical Education	45		
Physics B-23a	60		
Power Weaving D-24	135		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Mill Engineering B-34a*	30
Cotton Organization F-34	60	Power Weaving D-32	165
Cotton Quality Control F-32	15	Staple Fiber Manufacture F-33	15
Cotton Spinning F-30	135	Textile Testing G-31	30
Electricity B-31a*	30	Thesis F-35.	

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Physical Education	45
Cotton Winding and Twisting F-31	210	Power Weaving D-32	105
Knitting FK-30	90	Thesis F-35.	

* Not given in 1942-43.

Course II.—Wool Manufacture

The course on wool manufacturing is arranged for those who contemplate a career in the manufacture of woollen or worsted fabrics, and can devote but three years to the school work. It includes instruction on all of the varied processes employed in manipulating the wool fiber to produce yarn and cloth, namely, sorting, scouring, carding, combing, spinning, designing, weaving, dyeing and finishing. The work is carried on by lectures, recitations and practical work in the laboratories.

Beginning with the second year the details of manipulating wool from the grease to the finished yarn is taken up for close study. This includes the spinning of woollen yarn, also worsted yarn, by both the English and the French systems. The intermediate processes of sorting, scouring, carding, combing and top-manufacturing are taken in detail and in proper sequence. Instruction in the production and manipulation of re-worked wool is also included.

The general chemistry of the first year is followed by a lecture course in the second year on textile chemistry and dyeing.

Textile design, cloth analysis and construction are continued from the first year throughout the course, the work being applied especially to woollen and worsted goods. Weaving on power looms commences in the second year and continues through the third.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines.

Lectures on finishing commence with the third year and are augmented by extensive practice with the machines in the Finishing Department.

Work in the Engineering Department extends throughout all three years, and includes mechanical drawing, steam engineering and electricity. The practical application of the principles studied in these subjects is brought out forcibly in the work on mill engineering, where mill design and construction are considered. A short course covering methods employed in the testing of fibers, yarns, and cloths, together with laboratory work in the manipulation of certain physical apparatus, is given in the third year.

For detailed description of the subjects see page 32.

Course II.—Wool Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	45
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	120	Textile Design and Cloth Analysis D-10	60
Mathematics B-10	75		

SECOND YEAR. FIRST TERM

Fiber Preparation G-20-21	225	Textile Chemistry and Dyeing Lect. C-20	30
Physics B-23a	60	Textile Design and Cloth Construction D-21	75
Power Weaving D-24	90		
Steam Engineering B-24	45		

SECOND YEAR. SECOND TERM

Color D-33	15	Textile Chemistry and Dyeing Lect. C-20	30
Fiber Preparation G-20-21	210	Textile Design and Cloth Construction D-21	45
Physical Education	45		
Physics B-23a	60		
Power Weaving D-24	120		

THIRD YEAR. FIRST TERM

Electricity B-31a*	30	Textile Testing G-31	30
Knitting FK-30	105	Woolen and Worsted Finishing H-30	75
Mill Engineering B-34a*	30	Worsted Yarn Manufacture G-30	240
Power Weaving D-32	45		

THIRD YEAR. SECOND TERM

Physical Education	45	Woolen and Worsted Finishing H-30	60
Power Weaving D-32	135	Worsted Yarn Manufacture G-30	240
Spherical Trigonometry and Navigation	45	Thesis.	

* Not given in 1942-43.

Course III.—Textile Design

The general course in textile design is planned to meet the demand of young men for a technical training in the general processes of textile manufacturing, but with particular reference to the design and construction of fabrics. To this end a foundation is laid in the first year by instruction in the elementary principles of designing, decorative art and weaving. That he may later in the course pursue to advantage instruction in yarn manufacturing, weaving, dyeing, finishing and some engineering problems, a foundation course in mechanics, mathematics and chemistry is laid. As the student is required to pursue courses in the yarn departments, both cotton and wool, he acquires a knowledge of the manufacture of cotton yarns from the bale to the yarn, and of woollen and worsted yarns from the fleece through the varied processes of manufacturing woollen yarn or worsted yarn by both the French and Bradford systems.

Throughout his entire course he receives instruction in design, cloth analysis and construction of all the standard cloths, viz., trouserings, coatings, suitings, blankets, velvets, corduroys, plushes, etc. This is followed by advanced work in Jacquard designing and weaving, which serves not only to acquaint the student with the many kinds of cotton, woollen, worsted and silk fabrics of figured design, but stimulates and develops any artistic talent he may possess. Decorative art becomes an important part of the work of the second and third years.

The courses of freehand drawing, perspective, historic ornament and color serve as means in applying the instruction received in principles of design and textile styling to a better understanding of fashion trends and the changing designs that follow these. The actual pattern drafting and making of garments may be developed to a limited extent as time and individual skill permits.

The course in general inorganic and organic chemistry of the first year leads to the subject of textile chemistry and dyeing in the second year.

Power weaving commences with the second year and continues throughout the course, and work on all types of looms is required.

During the third year the student receives instruction in the finishing of cotton goods and woollen and worsted cloths. This instruction is given by means of lecture and laboratory work.

The engineering subjects given in the second and third years are intended to acquaint the student with such general knowledge as will be of assistance should he be called upon in later life to be a mill manager, or should his subsequent progress lead to some executive position in the operation of a textile plant.

For detailed description of the subjects see page 32.

Course III.—Textile Design

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	45
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	120	Textile Design and Cloth Analysis D-10	60
Mathematics B-10	75		

SECOND YEAR. FIRST TERM

Cotton Carding F-20b	60	Steam Engineering B-24	45
Color D-33	30	Textile Chemistry and Dyeing Lect. C-20	30
Physics B-23a	60	Textile Design and Cloth Construction D-20, 21	165
Power Weaving D-24	75		
Principals of Design D-34	30		

SECOND YEAR. SECOND TERM

Cotton Carding F-21b	60	Power Weaving D-24	120
Color D-33	30	Textile Chemistry and Dyeing Lect. C-20	30
Fiber Preparation G-20-21	75	Textile Design and Cloth Construction D-20, 21	105
Physical Education	45		
Physics B-23a	60		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Textile Testing G-31	30
Cotton Spinning F-30b	60	Woolen and Worsted Finishing H-30	75
Power Weaving D-32	60	Worsted Yarn Manufacture G-30	90
Textile Design and Cloth Construction D-30	135		

THIRD YEAR. SECOND TERM

Color D-33	45	Spherical Trigonometry and Navigation	45
Cotton Finishing H-31	75	Textile Design and Cloth Construction D-30	60
Cotton Winding and Twisting F-31b	60	Woolen and Worsted Finishing H-30	60
Jacquard Design D-23	30	Worsted Yarn Manufacture G-30	60
Physical Education	45	Thesis	
Power Weaving D-32	45		

Course IV.—Chemistry and Textile Coloring

The four-year course in Chemistry and Textile Coloring, leading to the degree of B.T.C., is especially intended for those who wish to engage in any branch of textile chemistry, textile coloring, bleaching, finishing or the manufacture and sale of the dyestuffs or chemicals used in the textile industry. The theory and practice of all branches of dyeing, printing, bleaching, scouring and finishing are taught by lecture work supplemented by a large amount of experimental laboratory work and actual practice in the dyehouse and finishing room.

The underlying theories and principles of chemistry are the same, no matter to what industry the application is eventually made. Furthermore, no industry involves more advanced and varied applications of the science of chemistry than those of the manufacture and application of the coal-tar coloring matters. In addition, the textile colorist must consider the complex composition of the textile fibers, and the obscure reactions which take place between them and the other materials of the textile industry.

During the first year general chemistry, including both inorganic and organic, is taught by lectures and laboratory work, and this is supplemented during the second term by qualitative analysis and stoichiometry.

Advanced inorganic chemistry, as well as advanced organic chemistry, is studied during the second and third year as a continuation of the elementary chemistry of the first year, and much time is spent upon quantitative analysis, industrial chemistry, and textile chemistry and dyeing.

The foundation work in general chemistry is continued during the third year with courses in physical chemistry, organic laboratory work and analytical work. The subject of industrial chemistry is introduced, and much time is devoted to advanced textile chemistry, dye testing, color matching, calico printing, and woolen, worsted and cotton finishing.

The fourth year is characterized by an endeavor to present certain subjects of a more applied nature in such a manner that the student's reasoning power and ability to apply the knowledge gained during the first three years may be developed to the fullest extent. The subject of engineering chemistry is introduced, and the work in the dyeing and analytical laboratories is applied as far as possible to the actual requirements of the factory chemist and colorist. Much time is also spent in the organic chemistry laboratory, particular attention being given to the preparation of typical dyestuffs. Thorough courses are given in microscopy, photomicrography and the use of various instruments such as the spectroscope, ultra-microscope, polariscope, tintometer and other optical instruments applicable to experimental work in connection with the textile industry. Courses are also given in report writing and textile literature.

During this fourth year the student has an opportunity to take several elective subjects of an advanced nature and conduct such research work and original investigation as time may permit.

For detailed description of the subjects see page 32.

Course IV.—Chemistry and Textile Coloring

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Advanced German E-21	45	Quantitative Analysis C-23	130
Organic Chemistry C-22	30	Stoichiometry C-24	15
English E-20	30	Textile Chemistry and Dyeing	
Mathematics B-20a	60	Lab. C-21	90
Physics B-23	65	Textile Chemistry and Dyeing	
Power Weaving D-24a	15	Lect. C-20	45

SECOND YEAR. SECOND TERM

Advanced German E-21	30	Spherical Trigonometry and Navigation	15
Organic Chemistry C-22	30	Stoichiometry C-24	15
English E-20	30	Textile Chemistry and Dyeing	
Physical Education	45	Lab. C-21	120
Physics B-23	83	Textile Chemistry and Dyeing	
Quantitative Analysis C-23	112	Lect. C-20	45

THIRD YEAR. FIRST TERM

Organic Chemistry C-34	15	Physical Chemistry C-33	45
Adv. Textile Chemistry and Dyeing Lab. C-32	135	Quantitative Analysis C-30	150
Adv. Textile Chemistry and Dyeing Lect. C-32	30	Technical German C-35	30
Economics E-30	45	Woolen and Worsted Finishing H-30	75

THIRD YEAR. SECOND TERM

Adv. Textile Chemistry and Dyeing Lab. C-32	150	Physical Chemistry C-33	45
Adv. Textile Chemistry and Dyeing Lect. C-32	15	Physical Education	45
Economics E-30	45	Quantitative Analysis C-30	105
Industrial Chemistry C-31	30	Technical German C-35	30
		Woolen and Worsted Finishing H-30	60

FOURTH YEAR. FIRST TERM

Adv. Textile Chemistry and Dyeing Lab. C-44	105	Electives or Thesis C-52	90
Adv. Textile Chemistry and Dyeing Lect. C-44	30	Organic Laboratory C-41	75
Chemical Textile Testing C-43	60	Quantitative Analysis C-46	15
Colloid Chemistry C-50	30	Report Writing C-47	15
Industrial Chemistry C-42	30	Seminar in Business English E-40	15
Microscopy and Photomicroscopy C-45	60	Technical German C-40*	15
		Textile Marketing B-42*	30

FOURTH YEAR. SECOND TERM

Advanced General Chemistry C-49	30	Organic Laboratory C-41	120
Adv. Textile Chemistry and Dyeing Lab. C-44	135	Rayon Manufacturing C-51	15
Adv. Textile Chemistry and Dyeing Lect. C-44	15	Spherical Trigonometry and Navigation	45
Chemical Textile Testing C-43	60	Technical German C-40*	15
Electives or Thesis C-52	90	Technology of Wool Fibers G-40	15
		Textile Literature C-48*	30

* Not given in 1942-43.

Course VI.—Textile Engineering

This course is the four-year general textile course leading to the degree of Bachelor of Textile Engineering (B.T.E.), and aims especially to fit men, in the broadest possible manner, to meet the increasing demands of every branch of the textile industry for men with combined textile and technical preparation. The magnitude and scope of the textile and allied industries fully justify the most thorough technical training possible for all who aspire to leadership in this field.

The course is planned so as to provide a foundation in those subjects which are essential to the training of an engineer, coupled with a thorough understanding of textile processes and materials. Such subjects as mathematics, physics, chemistry, drawing, mechanics and mechanism, provide for the first objective. The second is secured by a study of cotton, woolen and worsted yarn manufacturing, textile designing, weaving, knitting, dyeing, and finishing. Instruction is by means of lectures, recitations and laboratory work.

A large proportion of the student's time is spent in well equipped textile departments where he is familiarized with the machinery and processes used in the conversion of cotton and wool fibers into yarns and finished fabrics. The subjects of textile testing and microscopy acquaints the student with the methods for determining the physical properties of textile fibers, yarns and fabrics.

To properly equip the student to meet the varied engineering problems which confront the mill manager or executive, or to so train him that he may enter those industries closely allied to the textile, instruction is given by lecture and laboratory practice in the several branches of engineering. Steam engineering considers the problems involved in steam generation and distribution for power, heating and manufacturing purposes, and includes the testing of laboratory and power plant equipment. The course in electrical engineering treats of the generation and transmission of electrical power, the testing of direct and alternating current machinery, and is intended to acquaint the student with modern practice. Mill engineering familiarizes the student with factory design, construction, heating, lighting, humidification, fire protection, and the arrangement of machinery and buildings for most efficient production and economical power distribution.

The broadening effect of such subjects as English and economics is carried still further in this course by carefully planned courses in business administration, accounting, cost accounting and business law.

During the fourth year the student is required to conduct an original investigation of some textile or allied problem, and to submit the results in the form of a satisfactory thesis before receiving his degree.

The Cotton and Wool Options of the Textile Engineering course have been provided for those students who may desire the breadth of technical training which this course offers but who wish to specialize in either cotton or wool manufacturing. In these optional courses the student's entire time is devoted to the study of that particular fiber which he elects. A demand from the distributing and marketing divisions of the textile industry for properly trained men has led to the establishment of the Sales Option of the Textile Engineering course. This is patterned after the General Course but with more time devoted to such subjects as selling, advertising, marketing, foreign trade and the like. There have also been requests for a four-year degree course in which the design of textile materials should receive the greater emphasis. For this purpose the Design Option of the Textile Engineering course is offered, which, while majoring in textile design, includes other subjects that make a broader course than the one of shorter duration.

In the General Option some recognition is given to those who may wish to lay more emphasis on knit fabrics. This is done by the substitution of knitting laboratory time for a portion of that assigned to weaving laboratory and is dependent on the possibility of arranging for such special cases.

For detailed description of subjects, see page 32. The curricula of the several optional courses will be found on pages 27 to 31.

Course VI.—Textile Engineering (General Course-G)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20b	75	Physics B-23	90
Fiber Preparation G-20, 21	105	Textile Chemistry and Dyeing	
Machine Drawing B-21.	45	Lecture C-20	30
Machine Shop B-26	75	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-22	45

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Physical Education	45
Cotton Carding F-21b	60	Physics B-23	90
Electives F-25		Power Weaving D-24	75
Fiber Preparation G-20, 21	75	Textile Chemistry and Dyeing	
Machine Drawing B-21.	30	Lect. C-20	30
Mathematics B-20	75		

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Spinning F-30b	60	Power Weaving D-32	60
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Electives F-35		Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Physical Education	45
F-31b	60	Spherical Trigonometry and Navi-	
Economics E-30	45	gation	45
Electrical Engineering B-31	75	Worsted Yarn Manufacture G-30 .	90
Heat Engineering B-33	90	Woolen and Worsted Finishing	
Mill Engineering B-34*	90	H-30	60

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42*	30
Cotton Organization F-34	60	Textile Microscopy B-41	60
Cotton Laboratory F-40	45	Textile Testing B-43	75
Electrical Engineering B-44	75	Thesis	
Mill Engineering B-45	75		

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Mill Illumination B-47*	45
Cotton Finishing H-31	90	Physical Education	45
Electives B-48 or F-45		Spherical Trigonometry and Navi-	
Electrical Engineering B-44	75	gation	45
Knitting FK-30a	105	Thesis	
Mill Engineering B-45	75		

* Not given in 1942-43.

Course VI.—Textile Engineering (Cotton Option-C)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20a	150	Textile Chemistry and Dyeing	
Cottons F-22	15	Lecture C-20	30
Machine Drawing B-21	90	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-20	90
Physics B-23	90		

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Physics B-23	90
Cotton Carding F-21a	90	Power Weaving D-24	60
Cotton Waste Processing F-23	30	Textile Chemistry and Dyeing	
Machine Drawing B-21*	45	Lect. C-20	30
Mathematics B-20	75	Textile Design and Cloth Construc-	
Physical Education	45	tion D-20	60

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Quality Control F-32	15	Machine Shop B-26	45
Cotton Spinning F-30a	150	Power Weaving D-32	60
Economics E-30	45	Staple Fiber Manufacture F-33	15
Electrical Engineering B-31	75		

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Heat Engineering B-33	90
F-31a	195	Mill Engineering B-34*	90
Economics E-30	45	Physical Education	45
Electrical Engineering B-31	75	Power Weaving D-32	45

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Special Trigonometry	45
Cotton Organization F-34	60	Textile Marketing B-42*	30
Cotton Laboratory F-40	45	Textile Microscopy B-41	60
Electrical Engineering B-44	75	Textile Testing B-43	75
Mill Engineering B-45	30	Thesis	

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Physical Education	45
Cotton Finishing H-31	90	Special Trigonometry and Naviga-	
Electrical Engineering B-44	75	tion	45
Knitting FK-30	105	Mill Illumination B-47*	45
Mill Engineering B-45	30	Thesis	

* Not given in 1942-43.

Course VI.—Textile Engineering (Wool Option-W)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Fiber Preparation G-20, 21	210	Mathematics B-20	60
Machine Drawing B-21.	90	Physics B-23	90
Machine Shop B-26	45	Textile Chemistry and Dyeing Lecture C-20	30

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Physics B-23	90
Fiber Preparation G-20, 21	165	Power Weaving D-24	75
Machine Drawing B-21*	45	Textile Chemistry and Dyeing Lect. C-20	30
Mathematics B-20	75		
Physical Education	45		

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Power Weaving D-32	60
Economics E-30	45	Woolen and Worsted Finishing H-30	75
Electrical Engineering B-31	75	Worsted Yarn Manufacture G-30 .	150
Heat Engineering B-32	75		

THIRD YEAR. SECOND TERM

Economics E-30	45	Spherical Trigonometry and Navi- gation	45
Electrical Engineering B-31	75	Woolen and Worsted Finishing H-30	60
Heat Engineering B-33	90	Worsted Yarn Manufacture G-30 .	150
Mill Engineering B-34*	90		
Physical Education	45		

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42*	30
Electrical Engineering B-44	75	Textile Microscopy B-41	60
Mill Engineering B-45	30	Textile Testing B-43	75
Textile Design and Cloth Construc- tion D-21	75	Thesis	

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Spherical Trigonometry and Navi- gation	45
Electrical Engineering B-44	75	Textile Design and Cloth Construc- tion D-21	45
Knitting FK-30	105	Thesis	
Mill Engineering B-45	75		
Mill Illumination B-47*	45		
Physical Education	45		

* Not given in 1942-43.

Course VI.—Textile Engineering (Design Option-D)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20c	60	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	75	Lecture C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	90	tion D-20, 21	165
Principles of Design D-34	45		

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Power Weaving D-24	45
Fiber Preparation G-20, 21	75	Textile Chemistry and Dyeing	
Mathematics B-20	75	Lect. C-20	30
Physics B-23	90	Textile Design and Cloth Construc-	
Knitting FK-20	30	tion D-20, 21	75
Physical Education	45		

THIRD YEAR. FIRST TERM

Color D-33	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30	105
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Knitting FK-31	45	Woolen and Worsted Finishing	
Power Weaving D-32	75	H-30	75

THIRD YEAR. SECOND TERM

Color D-33	45	Spherical Trigonometry and Navi-	
Cotton Winding and Twisting F-31b	60	gation	30
Economics E-30	45	Textile Design and Cloth Construc-	
Physical Education	45	tion D-30	75
Power Weaving D-32	45	Worsted Yarn Manufacture G-30 .	90
Principles of Design D-34	45	Woolen and Worsted Finishing	
		H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Microscopy B-41	60
Jacquard Design and Weaving D-40	90	Textile Styling B-50	30
Textile Design and Cloth Construc-		Textile Testing B-43	75
tion D-41	75	Thesis	
Textile Marketing B-42*	30		

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Spherical Trigonometry and Navi-	
Cotton Finishing H-31	90	gation	45
Jacquard Design and Weaving D-40	120	Textile Design and Cloth Construc-	
Machine Shop Practice B-26	45	tion D-41	90
Perspective D-25	45	Thesis	
Physical Education	45		

* Not given in 1942-43.

Course VI.—Textile Engineering (Sales Option-S)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20b	75	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	105	Lecture C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	180

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	90	Lect. C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	105
Power Weaving D-24	105		

THIRD YEAR. FIRST TERM

Color D-33	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30	105
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Power Weaving D-32	75	Woolen and Worsted Finishing	
Principles of Marketing B-35	45	H-30	75

THIRD YEAR. SECOND TERM

Color D-33	45	Statistics B-53	45
Cotton Winding and Twisting		Textile Design and Cloth Construc-	
F-31b	60	tion D-30	75
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Marketing Methods B-36	60	Woolen and Worsted Finishing	
Power Weaving D-32	30	H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Design D-41	75
Principles of Selling and Advertis-		Textile Microscopy B-41	45
ing B-49*	105	Textile Styling B-50	30
Selling Policies B-52*	45	Textile Testing B-43	75
Jacquard Design and Weaving		Thesis	
D-40	45		

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Perspective D-25	45
Cotton Finishing H-31	90	Selling Policies B-52*	45
Foreign Trade and Economic Geog-		Spherical Trigonometry and Navi-	
raphy B-51*	45	gation	45
Knitting FK-30b	75	Thesis	
Machine Shop Practice B-26	45		

* Not given in 1942-43.

SUBJECTS OF INSTRUCTION

TEXTILE ENGINEERING DEPARTMENT—B

The various options are designated by G, C, W. D, S.

*The subjects listed for the Sales Option will be discontinued for the duration of the war.

Mathematics—B-10. Preparation: Admission Requirements. The work in the first term consists of algebra, plane trigonometry, and instruction in the use of the slide-rule. Algebra is reviewed through quadratics and then logarithms are taken. In plane trigonometry, right and oblique triangles are solved by means of natural and logarithmic functions, and the various algebraic relations among the trigonometric functions are proved and used in identities and equations. Significant figures and the use of approximate data in calculations are also discussed.

In the second term the following topics are taken up: spherical trigonometry and application to navigation, graphical and mathematical solution of quadratic and simultaneous equations, theory of equations, partial fractions, Napierian logarithms, equations of the straight line, equations of various curves, differentiation and integration of algebraic functions, and applications. [All courses.]

Physics—B-11. Preparation: Admission Requirements. Taken simultaneously with B-10. This subject is required as a necessary preparation for all courses, and is given during the first term of the first year. The fundamental principles of this subject are considered absolutely essential to a thorough understanding of the operation of all machinery, textile or otherwise. Some of the topics treated in this course are linear and angular velocity, uniform and accelerated motion, mass, momentum, inertia, effect of force in producing motion, centrifugal force, work, power, energy, principle of moments and its applications, parallelogram and triangle of forces with applications, resolution and composition of forces, the mechanical principles represented by the wheel and axle, differential pulley block, common pulley blocks, jackscrew, worm and wheel, inclined plane, hydrostatics, elements of hydraulics, kinetic energy, circular motion and harmonic motion.

LABORATORY. This course is supplementary to the lecture course and gives the student an opportunity to apply the knowledge gained in the lecture course by performing various experiments. [All courses.]

Mechanism—B-12. Preparation: B-10 and B-11. This subject is also deemed to be one of those absolutely essential to every student's preparation for the work of the following years. Whereas the principles studied are of general application, textile machinery in particular furnishes an unusually large variety of specific examples, and frequent reference is made to these in the development of the course. Some of the important topics covered are gearing and gear train design, belting and pulley calculations, cone and stepped pulley design, cam design, linkages, epicyclic gear trains, and intermittent motion devices. [All courses.]

Mechanical Drawing—B-13. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is taken during the first year and consists of work in the drawing room supplemented by lectures. This subject is considered of the greatest importance as a preparation for the student's future work, and the practical usefulness of drawing of this character is fully emphasized.

This course is systematically laid out covering in order the following divisions:—care and use of drawing instruments; lettering; geometrical constructions; orthographic projection; isometric projection; cross sections; dimensioning; sketching practice on machine details; working drawings; tracing and blueprinting; developments with practical application. [Courses I, II, III, VI.]

Machine Drawing—B-13a. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is similar to B-13, but not so extensive, and is given to students electing the Chemistry and Textile Coloring course. [Course IV.]

Mathematics—B-20. Preparation: B-10. This subject is a continuation of the first year subject B-10, and extends throughout the second year of the engineering course. In the first term the following topics are treated:—exponential functions, the circle, parabola, ellipse, hyperbola, polar coördinates, indefinite

integrals, summation by integration and applications of integration. In the second term the topics are: differentiation of transcendental functions, methods of integration, centers of gravity, moments of inertia, empirical formulas, nomographic charts, and spherical trigonometry and applications. [Course VI.]

Mathematics—B-20a. Preparation: B-10. This subject is a continuation of the work of the first-year subject B-10. A study of the derivatives and differentials is followed by applications of the differential to rates and errors. Other topics treated are the circle, parabola, ellipse, hyperbola, indefinite integrals, summation by integration, areas, volumes, pressures, exponential, logarithmic, trigonometric functions, and spherical trigonometry. [Course IV.]

Machine Drawing—B-21. Preparation: B-10, B-12, B-13. The work in Machine Drawing is devoted to working detail drawings of textile machinery and advanced graphical mechanism problems. In every case the data for all of these problems are taken directly from some of the textile machines that the students use in other departments. [Course VI, Options G, C, W.]

Physics—B-23. Preparation: B-10 and B-11. This subject lays the foundation for later work in engineering and chemistry and also explains the general application of the laws and principles of physics. Instruction, consisting of lectures, demonstrations, and recitations, is given for three hours per week during the second year. The topics taken up the first term are:—wave motion and sound, thermometry, measurement of heat, change of state, expansion, transfer of heat, humidity, elements of meteorology, nature and propagation of light, and photometry.

The second term is devoted to the study of light, magnetism, and electricity. Some of the topics are:—reflection and refraction, lenses, the telescope and microscope, the spectroscope, color sensation, double refraction, magnetism, electrostatics, fundamental laws of direct currents and electrolysis, electronics.

LABORATORY. A two-hour period per week for Course VI and a three-hour period every alternate week for Course IV accompanies the class work in this subject and is planned to illustrate precise methods for measuring various physical quantities. [Courses IV, VI.]

Physics—B-23a. Preparation: B-10 and B-11. This subject consists of the same topics as B-23 but does not contain any laboratory work. [Courses I, II, III.]

Steam Engineering—B-24. Preparation: B-12. This course consists of thirty lectures given in the first term of the second year. Its aim is to give those students who do not take the Textile Engineering Course a general knowledge of thermodynamics, the steam engine, steam turbine and gas engine and their auxiliaries, and waste heat reclamation. [Courses I, II, III.]

Applied Mechanics—B-25. Preparation: B-11, B-20. This course is divided into two parts: Graphic Statics and Strength of Materials. The first eight weeks of the semester which is devoted to Graphic Statics consists of the study of mathematical and graphical solutions for any system of forces. Centers of gravity and funicular polygons are introduced followed by roof and bridge truss problems under various conditions of dead, live, wind, and snow loading.

During the second half of the semester and during all the following semester, this course deals with Strength of Materials. So far as time permits, such topics as stress, strain, methods of testing materials, bending moments, shearing force, beam design, torsion, design of shafts, compound beams and columns, combined stresses, and like subjects are considered.

This subject is preparatory to the work in Mill Engineering of both the third and fourth years, at which time its practical value and application are clearly demonstrated. [Course VI, Options G, C, W.]

Machine Shop Practice—B-26. Preparation: B-11 and B-12. Systematic instruction is given in the most approved methods of machine shop practice, the object being to familiarize the student with the proper use of hand and machine tools, and the characteristics of the different materials worked. Particular attention is given to the form, setting, grinding and tempering of tools and the mechanism of the different machines involving certain speeds, feeds, etc. The course is so planned that the instruction in each typical operation shall conform as nearly as

possible to commercial machine-shop practice on textile machinery. The list of tools which appears under "Equipment" in this Bulletin gives an idea of the scope of the work, which includes chipping and filing, tool grinding and tempering, straight and taper turning, screw cutting, drilling and boring, planer work, milling machine work, including gear cutting. [Course VI, Options G, C, W.]

Applied Mechanics—B-30. Preparation: B-25. This is a continuation of Applied Mechanics B-25, and is given during the first term of the third year. [Course VI, Options G, C, W.]

Electrical Engineering—B-31. Preparation: B-23. The elementary principles of electricity and magnetism are considered in the lecture course on physics. Their development and application are taken up in this course in a detailed study of the magnetic and electric circuits during the first period of the first term. The second period is devoted to a study of the principles of direct current machinery. The laboratory work consists of a study of technical electrical measurements and dynamo-electric machinery, determining for the latter their operating characteristics.

The second term is devoted entirely to a study of the principles of alternating current circuits, including vector representation, effective values, power, series and parallel circuits. The laboratory work consists of a study of technical electrical measurements, some meter calibration including that of watt-hour meters and a study of alternating current circuits using electrical measuring instruments. [Course VI, Options G, C, W.]

Electricity—B-31a. Preparation: B-23a. This is a short course given in the third year of the manufacturing courses, and consists of thirty lectures covering briefly and in a general way the theory of direct and alternating current generators and motors. [Courses I, II.]

Heat Engineering—B-32. Preparation: B-12, B-20. The purpose of this course is to familiarize the student with the principles of elementary thermodynamics, the properties of steam, mechanical mixtures and combustion of fuels. The course consists of thirty exercises given in the first term of the third year. The lectures and recitations are supplemented with illustrative problems assigned for home preparation.

LABORATORY. The principles underlying the subjects of steam engineering, hydraulics and thermodynamics are demonstrated in a practical manner in the work in the Engineering Laboratory, given three hours per week. Greater importance is attached to the development of initiative and responsibility in the student than the mere accomplishment of a large number of carefully planned tests. The character of this work is indicated by the following list of experiments and tests:—

Calibration of scales, tanks, gauges, inductors and counters; barrel, separating and throttling calorimeter tests; heat exchange tests; boiler inspection and measurement; flue gas analysis; dynamometer tests; ejector and injector tests; Rankin's efficiency, actual thermal efficiency and duty tests; expansion of pipes, radiation and pipe covering tests; boiler test; trap tests, feed water heating tests; steam, triplex and centrifugal pump tests. [Course VI, Options G, C, W.]

Heat Engineering—B-33. Preparation: B-32. This course is a continuation of B-32, and consists of forty-five hours of lectures and recitations given in the second term of the third year of the Textile Engineering course. The subjects developed are the kinematics of reciprocating steam engines, steam turbines and gas engines. Special attention is given to the mechanical principles on which the steam engine operates, with detail discussion of the valve gear and governing devices, and the various diagrams used for studying the same. Consideration is given to the underlying heat theory and to the details of construction of the various parts of the machines. During the latter part of the course the historical development, classification and types of turbines and gas engines are discussed.

LABORATORY. The character of the work in the Engineering Laboratory, given three hours per week during the second half of the third year, is indicated by the following list of experiments:—

Boiler inspection and measurement; Rankin's efficiency, actual thermal efficiency and duty tests; boiler test; valve setting by measurement and by indicator;

condenser test; non-condensing and condensing engine and turbine tests; heating and ventilating fan tests; lap and butt riveted joint test; nozzle test; gas engine test; flow of air and air compressor tests. [Course VI, Options G, C, W.]

Mill Engineering—B-34. Preparation: B-21, B-25. Mill Engineering, as presented in thirty lectures during the third year of the Textile Engineering course, consists of a discussion of the following topics: the investigation of the subsoils for the footing course of the foundation; building materials; design of walls, beams, floors, and construction of windows, doors, stairways and roofs.

Sixty hours of drawing-room and laboratory practice are devoted to plane surveying, contour plotting, cut and fill calculations, setting of batter boards, alignments of shafting and the study from blue-prints of slow-burning construction. [Course VI, Options G, C, W.]

Mill Engineering—B-34a. Preparation: B-21. Mill Engineering, as presented in thirty lectures during the third year of the diploma courses, is largely general in its nature and includes only parts of Course B-34. [Courses I, II.]

***Principles of Marketing—B-35.** An introduction to the basic principles underlying the modern systems of distributing goods with special emphasis on the raw and finished products of the textile industry. The course will cover the history and economic importance and functions in modern distribution of the selling agent, the commission man, the broker, jobber, merchant, factor and other intermediaries as well as the channels that goods may take from the producer to the ultimate consumer. The importance and advantages of each will be studied with special emphasis on the present practice and trends in the textile industry.

Lectures and the case method of instruction will be employed. [Course VI, Sales Option.]

***Marketing Methods—B-36. Preparation: B-35.** A continuation of the Principles of Marketing. The course will be conducted by means of lectures and case problems and discussions. Some of the subjects studied in detail are,—the planning of marketing campaigns, the fluctuations of price and style, forecasting, the business cycle, quotas, market surveys and research, sales planning and control, industrial marketing, and consumer merchandising.

Considerable time will be devoted to the study of current literature and events in the textile field. [Course VI, Sales Option.]

Spherical Trigonometry and Navigation. Preparation B-10 and B-20. This subject takes up the solution of right and oblique spherical triangles followed by applications to air and marine navigation. The use of the Nautical Almanac and other tables for working out observations is explained. Piloting and dead reckoning are also taken up. (Three hours per week, elective, for juniors and seniors.)

Accounting—B-40. Preparation: B-10 and E-30. The purpose of this course is to acquaint the student with the principles and modern methods of accounting for mercantile and manufacturing businesses. It is not intended to make him a proficient bookkeeper or accountant, but the nature of the subject necessitates a basic knowledge of double-entry bookkeeping, the functions of ledger accounts, and of the use of checks, drafts, notes, vouchers, etc., in ordinary business transactions. This is developed during the summer preceding the senior year by requiring the student to take a course in double-entry bookkeeping, thus saving valuable time during the school year and effectively preparing the ground for the instruction work.

The first half of the course is based on a study of the proper form and content of the balance sheet and profit and loss statement, the principles and problems involved in the correct valuation of asset and liability items, and the related topics of depreciation, reserves, capital, surplus and dividends.

The second half of the course is devoted to cost accounting and is planned to give the student a knowledge of the best cost methods in use at the present time. It includes a thorough discussion of methods of handling and accounting for raw materials, direct labor, the distribution of overhead expenses, normal costs and their predetermination, budgeting, and cost reports and their use. [Course VI.]

Textile Microscopy—B-41. Preparation: B-23. This subject consists of the study of animal and vegetable fibers by means of the microscope and its accessories. It includes methods of illumination, sectioning and mounting, drawing

with the camera lucida, measurements of diameter and twist, precision sectioning, and the use of polarized light in the study and identification of fibers. [Course VI.]

***Textile Marketing—B-42. Preparation: E-30.** This subject covers the problems of marketing textile products, with particular emphasis upon the ultimate consumer. The course will survey the principal marketing channels and marketing methods. Attention is directed to the possibilities of demand creation and demand control, especially through market and style research. Current changes in marketing organization of the industry will be studied and reviewed. [Courses IV and VI, Options G, C, W, D.]

Textile Testing—B-43. Preparation: B-23, F-30 or G-30, D-32. This course is planned to familiarize the student with the latest methods and devices for determining the physical properties and characteristics of textile fibers, yarns and fabrics. The scope of the work is indicated by the following topics: abrasion, absorptability, atmospheric control, bursting, crimp, heat transmission, porosity, regain, resilience, stretch, tear, tensile strength, thickness, twist, waterproofness, precision of measurements, interpretation and presentation of data. These are treated both from the standpoint of commercial testing and of textile research. One two-hour period per week of testing laboratory work is included in the course. [Course VI.]

Textile Testing—B-43a. Preparation: B-23, F-20 or G-20, D-20 or D-21. This subject is presented in thirty lecture periods during the third year of the diploma courses. It is similar in content to B-43 but less extensive. [Courses I, II, III.]

Electrical Engineering—B-44. Preparation: B-31. During the first term a detailed study of the alternator is made, with particular stress on generation of three-phase currents. Methods of predetermination of alternator regulation are taken up and at least one method compared with laboratory test: Parallel operation of alternators with accompanying instruments and devices are studied in classroom and laboratory. The single phase, three-phase and Scott transformers are considered in turn and their various methods of connecting to line and alternators are systematically studied.

In the second term the induction motor and generator are studied with their particular adaptability to the textile industry. The principal starting devices for this motor are thoroughly taken up. The synchronous motor is studied particularly in relation to its ability to correct power factor. In all the work outlined above, the main features are illustrated profusely in classroom demonstrations and laboratory exercises. [Course VI, Options G, C, W.]

Mill Engineering—B-45. Preparation: B-34. This subject, given in the fourth year of the Textile Engineering course, includes many new topics, and at the same time coordinates much of the student's previous work in engineering with his knowledge of textile processes and their requirements. In detail it takes up a study of modern types of mill buildings and problems involved in their construction. Such matters as factory location, machinery layout, power transmission, heating, ventilation, humidification, fire protection and sanitary facilities are also discussed. The student is finally assigned the problem of completely designing a textile mill building and laying out its machinery and equipment so far as time permits. [Course VI, Options G, C, W.]

Business Administration—B-46. Preparation: B-10 and E-30. Recognizing the importance which executive work plays in the management of an industrial enterprise, this course has been placed in the curriculum of the Textile Engineering course in order to acquaint the student with some of the fundamental problems and principles involved, and possibly to reveal to him some of his own capabilities for this type of work. The broad topics considered are types of business organizations, financing, administration, planning, control, personnel, and human relationships. The importance of applied psychology to successful management is stressed. The student is made familiar with some of the tools of management such as purchasing systems, storeskeeping, perpetual inventories, warehousing methods, scheduling, routing, tracing, time keeping, motion studies, time studies, mnemonic symbolizing, graphical records, and wage systems.

BUSINESS LAW. Under this subject are given lectures, supplemented by the use of a suitable text, on the law governing contracts, sales, agency, partnerships,

corporations, negotiable instruments, bailments and carriers, insurance, personal property, real property, suretyship and guaranty, and bankruptcy. [Course VI.]

***Mill Illumination—B-47. Preparation: B-23.** Because of the demand and the necessity for proper lighting of textile mills, this course is offered three hours per week for one term. It consists of three major parts,—photometry, illumination and installation design. Costs and estimates, safety and production are included.

The laboratory exercises include the study and applications of the photometer, Macbeth Illuminometer and foot-candle meter. The concluding work is a design of a lighting installation for a typical mill room, using the school laboratories for this purpose. [Course VI, Options G, C, W.]

Electives—B-48. Students in the second term of the fourth year of the Textile Engineering course will be permitted to elect certain textile subjects as substitutes for part of the time scheduled for engineering subjects. Thus a student is offered an opportunity for specialized study along such lines as will prove most beneficial to him at that time. The selection of elective studies is subject to the approval of the head of the Textile Engineering department and to the possibility of arranging for the same. [Course VI, Option G.]

***Principles of Selling and Advertising—B-49. Preparation: B-36.** A comprehensive course dealing with the fundamental principles of advertising and selling. The course will cover the psychology of selling and advertising, the legal restrictions in marketing, advertising technique, copy writing, layout, illustrations, advertising campaigns, packaging, advertising mediums, industrial and consumer advertising, creative salesmanship, personality, types of customers, the selling process, supersalesmanship, etc.

Lectures and the case method of instruction will be used. [Course VI, Sales Option.]

Textile Styling—B-50. Preparation: D-30. This includes fabric names, their distinguishing characteristics, purpose and suitability; study of the costume in line, mass, color and texture; the silhouette, its changes and recurrences as well as influences that in the past have changed costume as an aid to better forecast of fabrics. [Course VI, Options D, S.]

***Foreign Trade and Economic Geography—B-51. Preparation: E-30.** The course will cover the foreign markets for finished textiles and the American raw fibers, methods of selling employed, foreign commercial law that an American exporter needs, the foreign fibers and textiles and their importance in international trade.

Special emphasis will be given upon costs of foreign marketing, tariffs, international competition, possible markets and methods of building an export business. [Course VI, Sales Option.]

***Selling Policies—B-52. Preparation: B-36.** This course will cover the development of administrative policies and guiding principles in the marketing, pricing, styling and merchandising of textiles and textile fibers. [Course VI, Sales Option.]

***Statistics—B-53. Preparations: B-20.** A study of elementary statistics which relate to industry, trade and general business and financial conditions. It includes the analysis, presentation and interpretation of statistical data, index numbers, correlation, law of error, cyclical fluctuations, dispersion, trend and other pertinent topics. [Course VI, Sales Option.]

CHEMISTRY AND DYEING DEPARTMENT—C

Elementary Inorganic Chemistry—C-10. Preparation: Admission Requirements. During the first term of the first year, the class work in this course consists of three lectures, and one recitation per week on fundamental principles, and descriptive chemistry of the non-metallic elements and their compounds. This is accompanied by one afternoon per week of laboratory work, which may be on either inorganic preparations or qualitative analysis, according to the previous laboratory training of the individual student.

In the second term, one lecture and one recitation per week are devoted to the metals and their compounds, and one afternoon per week wholly to qualitative analysis, listed below as C-12. [All courses.]

Elementary Organic Chemistry—C-11. Preparation: Admission Requirements. This course, covered by lectures during the second term, includes a general survey of the fundamental principles of Organic Chemistry, also a study of the hydrocarbons and their derivatives from the point of view of their structure, preparation and uses. This work, although elementary in character, is of sufficient breadth to prepare the student understandingly for the general lectures upon coal-tar dyestuffs which are given in Course C-20. [All courses.]

Qualitative Analysis—C-12. Preparation: C-10, taken simultaneously. This is a continuation of the laboratory study of inorganic compounds, with application to their systematic analysis. It is given ten hours per week to chemists during the second term of the first year. Students with adequate preparation can make further progress by starting this work in place of elementary laboratory exercises during the first term, as indicated under C-10.

When sufficiently advanced, students take up the examination of various products with which the textile chemist must be familiar such as mordanted cloths, pigments and the various dyeing reagents.

SEMI-MICRO QUALITATIVE ANALYSIS.—Qualitative analysis for the more common elements by micro methods, with centrifuge, spot tests, etc. [Course IV.]

Qualitative Analysis—C-12a. Preparation: C-10, taken simultaneously. This course is similar to C-12, but not so extensive, being given three hours per week during the second term. [Courses I, II, III, VI.]

Stoichiometry—C-13. Preparation: C-10, taken simultaneously. Two hours per week during the second term of the first year, on the fundamental principles underlying calculations of quantitative analysis, on the gas laws, and on balancing of chemical equations. [Course IV.]

Textile Chemistry and Dyeing—C-20. Preparation: C-10, C-11, B-12, B-13a. The outline of the lecture course which is given during the second year is as follows:—

TECHNOLOGY OF VEGETABLE FIBERS.—Cotton, linen, jute, hemp, china grass. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ANIMAL FIBERS.—Wool, mohair, silk. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF MANUFACTURED ORGANIC FIBERS.—Study of the various forms of manufactured organic fibers, including the rayons and such other manufactured fibers as nylon, vinyon and lanital, the process of manufacture, their properties and action with chemicals.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching; action of soap.

The bleaching of cotton cloth, yarn and raw stock is studied at length with detailed description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is also included an exhaustive study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods for degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods for detection, their effect during the different operations of bleaching, scouring, dyeing and printing and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds, not dyestuffs, that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting assistants, mordanting principles and leveling agents.

THEORY OF DYEING.—A discussion of the chemical, mechanical, solution and absorption theories, and the various views that have been advanced by different investigators of the chemistry and physics of textile coloring processes.

Under this heading are discussed the general methods of classifying dyestuffs and the definitions of such terms as textile coloring, dyeing, textile printing, substantive and adjective dyestuffs, monogenetic and polygenetic dyestuffs.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, turmeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used within recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown and iron buff.

COAL-TAR COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Special study of basic coloring matters, phthalic anhydride colors, including the eosins and phloxines; acid dyestuffs, Janus, direct cotton, sulphur and mordant colors, including the alizarines and other artificial coloring matter requiring metallic mordants; mordant acid and insoluble azo colors, developed on the fiber; reduction vat colors, aniline black and other artificial dyestuffs not coming under the above heads.

As each class of dyestuffs is taken up, the details of the methods of applying them upon all the different classes of fabrics and in all the different forms of dyeing machines are thoroughly discussed; also the difficulties which may arise in their application, and the methods adopted for overcoming them.

MACHINERY USED IN DYEING.—A certain amount of time is devoted to the description of the machinery used in various processes of textile coloring which is supplemented as far as possible by the use of charts, diagrams and lantern slides.

Most of the important types of dyeing machines are installed within the dye-house of the school, and the students can be taken directly from the lecture room and shown the machines in actual operation. [All courses.]

Dyeing Laboratory—C-21. Preparation: C-20 taken simultaneously. Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and systematic experiments the student learns the nature of the various classes of dyestuffs and their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool, silk and the various types of rayon, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye bath, etc.

Bleaching processes applicable to various animal and vegetable fibres are studied.

Work in color matching is also carried out on a laboratory scale. A fairly extensive study of the fastness properties of representative dyes of each class is taken up as well as their suitability for various classes of work.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines which are described elsewhere.

By the use of a small printing machine the principles of calico printing are illustrated, and by means of the full-sized dyeing machines and vats the practical side of the subject is studied. It is the constant endeavor of those in charge to impart information of a theoretical and scientific character that will be of value in the operation of a dyehouse. [Course IV.]

Organic Chemistry—C-22. Preparation: C-11. The purpose of this course is to lay a broad foundation for the understanding of the basic principles of organic chemistry. The first semester consists of illustrated lectures and recitations covering the aliphatic series. The second term is devoted to the aromatic compounds. A number of problems are assigned as home exercises in order to fix the fundamental principles of the science in the student's mind. Books: Wertheim—Organic Chemistry and E. H. Huntress—Problems in Organic Chemistry. [Course IV.]

Quantitative Analysis—C-23. Preparation: C-12. The object of this course is to teach the fundamental principles of quantitative analysis, and to give the student an opportunity of acquiring skill in manipulating the special apparatus used in analytical procedure.

Typical gravimetric methods are taught the first term. The samples analyzed comprise salts, minerals and ores. Electrochemical analysis is carried out with the aid of a modern type of apparatus designed for rapid work.

The work of the second term consists of volumetric methods. A number of ores and commercial products, carefully chosen, are analyzed so as to give the student a varied experience.

The laboratory work is supplemented by lectures and recitations. Talbot's "Quantitative Chemical Analysis" 1937 Edition is used as a text. [Course IV.]

Stoichiometry—C-24. Preparation: B-10, C-10, C-13. This subject is taken one hour a week during the second year. Calculations of gravimetric analysis are studied the first term, and calculations of volumetric analysis the second term. Hamilton and Simpson's Calculations of Quantitative Chemical Analysis is used as a text. [Course IV.]

Quantitative Analysis—C-30. Preparation: C-23. The fundamental principles acquired in Course C-23 are applied in this course in the examination of materials used in the textile mill, the dyehouse, and the finishing plant. Among the materials analyzed are water, soaps, oils, fuels, and stripping agents. The latest and most practical methods are employed. Mahin's Quantitative Analysis, supplemented by "Analytical Methods for a Textile Laboratory" (as printed in the Year Book of the American Association of Textile Chemists and Colorists) is used as a text. [Course IV.]

Industrial Chemistry—Inorganic—Lecture—C-31. Preparation: C-22. During the second term of the third year lectures and recitations are held in industrial chemistry, the course in general following Riegel's "Industrial Chemistry," Third Edition. Particular attention is paid to the purification of industrial water supplies, the manufacture of heavy chemicals, such as acids, alkalies, bleach liquors, and mordants; the building industry, including the manufacture of Portland cement, glass, iron and steel.

The course is illustrated as far as possible with specimens, diagrams, and charts, and the students are given an opportunity to visit some of the industrial establishments in the vicinity of Lowell and Boston. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-32. Preparation: C-20, C-21. This is a continuation of the Textile Chemistry and Dyeing course of the second year, and includes a review of the second year's work in this subject, with the introduction of many advanced considerations, and in addition, the following subjects:—

COLOR MATCHING AND COLOR COMBINING.—A study of that portion of physics which deals with color and the many color phenomena of interest to the textile colorist. The lecture work is supplemented with the practical application of the spectroscope and tintometer, and much practice in the matching of dyed samples of textile material.

The primary colors both of the scientist and textile colorist, the results of combining coloring lights and pigments, and such subjects as color perception, color contrast, purity of color, luminosity, hue, color blindness, dichroism, fluorescence and the effect of different kinds upon dyed fabrics, are discussed under this heading.

Each student's eyes are tested for color blindness early in the course, in order that he may be given an opportunity to change his course if his eyes should prove defective enough to interfere with his work as a textile colorist.

A dark room has been provided where various experiments in color work and color matching may be performed.

DYE TESTING.—This subject includes the testing of several dyestuffs of each class, subjecting them to the common, color-destroying agencies; the determining of their characteristic properties, and their action towards the different fibers; also the determining of the actual money value and coloring power of dyestuffs in terms of a known standard.

Each student is required to make a record of each color tested upon an especially prepared card, which furnishes a permanent record of all dyestuffs, their dyeing properties, fastness to light and weather, washing, soaping, fulling, perspiration, bleaching, steaming, ironing, rubbing, acids and alkalies.

UNION DYEING.—A study of the principles involved in the dyeing of cotton and wool, cotton and silk, and silk and wool union materials in the production of solid and two-color effects.

TEXTILE PRINTING.—A thorough study of the whole subject of textile printing, each student being required to produce individually no less than twenty different prints, including the following styles; pigment style, direct printing style, steam style with tannin mordant, steam style with metallic mordant, madder or dyed style, the ingrain or developed azo style, discharge dye style, discharge mordanted style, resist style, indigo printing, aniline black printing.

The different parts of the calico printing machine are thoroughly studied; also the precautions which must be considered in its use, and the arrangement of the dyeing apparatus which must accompany such a machine.

Special attention is paid to the methods of mixing and preparing the various color printing pastes that are used in the above work upon a manufacturing scale as well as experimentally in the laboratory.

COTTON FINISHING.—A study of the various processes of finishing cotton cloth and the different materials used therein. The work involves the discussion of the various objects of cotton finishing and such operations as pasting, damping, calendering, stretching, stiffening, mercerizing, beetling and filling, and the various machines used for carrying out these processes.

DYE HOUSE AND FINISHING PLANT MANAGEMENT.—A study of the organization and management of the modern bleacheries, dyehouses and finishing plants.

MILL VISITS.—During the third and fourth years visits are made to some of the large dyehouses, bleacheries and print works in the vicinity. [Course IV.]

Physical Chemistry—C-33. Preparation: B-10, C-10, C-13. During the third year, three hours per week of lectures and recitations are given on the application of the experimental methods and calculations of physics to chemical phenomena. Students passing this course may supplement it by the optional laboratory course C-42 in the fourth year. [Course IV.]

Organic Chemistry—C-34. Preparation: C-22. This course (one semester) is a continuation of Organic Chemistry C-22 extending over the alicyclic and heterocyclic series. The lectures also touch upon certain special topics such as general synthetical methods; theoretical considerations, natural products (vitamins, hormones, chlorophyll, the blood pigments, alkaloids), dyestuffs, etc. Book: Panagiotakos—Organic Chemistry. [Course IV.]

Technical German—C-35. Preparation: C-20, C-22, E-21. This course consists of the reading of German technical literature with the object of familiarizing the student with the current German publications in textile chemistry and coloring. [Course IV.]

Technical German—C-40. Preparation: C-35. This is a continuation of Technical German C-35. [Course IV.]

Organic Chemistry Laboratory—C-41. Preparation: C-20, C-22, C-23. A number of typical organic compounds are synthesized by general methods. A special problem is also assigned to train the student in longer or more difficult syntheses. Laboratory Book: Gatterman-Wieland—Laboratory Methods of Organic Chemistry. The second semester is devoted to the qualitative identification of organic compounds. Laboratory book: Mulliken-Huntress—Identification of Organic Compounds. [Course IV.]

Industrial Chemistry—Organic—C-42. Preparation: C-31. The chemistry and technology of the important organic industries, *i.e.*, rubber, petroleum, dyestuffs, drugs, explosives, oils, fats, soaps, waxes, plastics, fermentation products, etc., is considered, with special emphasis on rubber, petroleum and explosives in view of present war conditions. Synthetic methods and the research and development phases are stressed. [Course IV.]

Chemical Textile Testing—C-43. Preparation: C-21, C-32. A series of lecture and laboratory periods covering the theory and use of the instruments and methods used in testing and evaluating textile materials.

PHYSICAL TESTING.—Statistical methods, relative humidity, regain, staple, hair weight, fiber resiliency, counts and denier, twist, evenness, cloth count, weight, crimp, thickness, porosity, permeability, waterproofness, wetting out, absorbency, shrinkage, thermal insulating value, handle or draping quality, wear or abrasion, strength and stretch.

CHEMICAL TESTING.—Inorganic extraneous matter: ash, ash alkalinity, silk weighting, acids and alkalis. Organic extraneous matter: scouring loss, extraction, sizing and finishing materials. Fiber mixtures: qualitative analysis, quantitative analysis. Swelling and damage in cellulose fibers: qualitative tests, barium activity number, ash alkalinity, solubility in sodium hydroxide, Methylene Blue absorption, copper number, fluidity. Damage to wool: lead acetate test, thiocyanate test, Pauly test, methylene blue test, sulfur content, total nitrogen content, soluble nitrogen, ammonia nitrogen, solubility in dilute alkali. Damage to silk: Zimmermann test, total nitrogen, ammonia nitrogen, viscosity in zinc chloride.

OPTICAL TESTING.—Colorimeter, tintometer, pH apparatus, refractometer, spectroscopy, spectrophotometer, ultra-violet, infra-red, luster. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-44. Preparation: C-32. This is a continuation of the third-year work in Advanced Textile Chemistry and Dyeing, and includes the following subjects:—

CLASSIFICATION AND MOLECULAR STRUCTURE OF ARTIFICIAL DYE STUFFS.—A study from a more advanced standpoint of the classification and constitution of artificial dyestuffs including the various methods used in their production, also the orientation of the various groups which are characteristic of these compounds and their effect on the tinctorial power of dyestuffs.

The object of this study is to give the student a more complete knowledge of the artificial dyestuffs from the color manufacturer's point of view, which will prove of particular value to those who intend later to enter the employ of dyestuff manufacturers or dealers.

ECONOMICS OF THE DYEING, BLEACHING AND FINISHING INDUSTRIES.—A study of the factors to be considered in the establishment of a dyeing, bleaching and finishing plant together with the most essential considerations of its management.

ADVANCED DYEING CONFERENCE.—During the latter part of his course each student will be required to write, for presentation before the other members of his class, a paper upon some assigned subject of general interest. After presentation the subject will be open to discussion and question.

The object of this conference is twofold. First, to give the student experience and practice in systematically looking up an assigned subject and presenting it before others; and secondly, to bring before the class a greater variety of subjects with more detail than could be covered by the general lectures of the course. [Course IV.]

Microscopy and Photomicroscopy—C-45. Preparation: B-23, C-20, C-22. A course of lectures and laboratory experiments on the use and construction of various types of microscopes and accessories, followed by the preparation of longitudinal and cross-sectional mounts of the various fibers. After a study of the different starches, fibers, and fabrics, a series of unknowns are examined and reported upon.

The lectures also include the subject of photomicroscopy. The laboratory course may be selected by the student as an optional course. [Course IV.]

Quantitative Analysis—C-46. Preparation: C-30. This course consists of lectures, recitations and quizzes on fuels and on the fundamental principles of analytical chemistry. [Course IV.]

Report Writing—C-47. Preparation: B-20a, E-20. The primary purpose of this course is to enable the student to write a technical report clearly and precisely; to this end it is necessary to present the data efficiently and with due regard to its accuracy. The meaning and determination of significant figures, the applications of statistical analysis, and the preparation and use of graphs are first studied. Suggestions on experimental work and the interpretation of results are then given. Formal and informal, technical and non-technical, laboratory, plant, and consultants' reports are discussed, and practice is given in their preparation. Instruction is also given on the use of the technical literature and the preparation of bibliographies. [Course IV.]

Textile Literature—C-48. Preparation: C-47. The object of this course is to introduce the student to the classical and current sources of information on textile chemical subjects. Each student is given certain references or subjects to report upon, which are sufficiently varied in origin as to make him familiar with the principal reference works and journals of textile chemistry. [Course IV.]

Advanced General Chemistry—C-49. Preparation: C-10, C-12, C-24, C-34, C-42, C-46. The object of this course is more to correlate the various branches of chemistry studied in the previous three and one-half years than to introduce new material. An attempt is made to show the essential oneness of all chemical knowledge. Recent theories are discussed briefly. [Course IV.]

Colloid Chemistry—C-50. Preparation: C-33. A lecture course on general colloid chemistry followed by its applications to textiles.

GENERAL.—Adsorption, surface tension and wetting-out, preparation and precipitation of suspensoidal sols, electrophoresis, emulsions, preparation and precipitation of emulsoidal sols, properties of irreversible emulsoids, protective colloids and detergents, gels, amorphous solids, use of X-rays, properties of proteins.

TEXTILE APPLICATIONS.—Cellulose, swollen cellulose, hydrocellulose, oxycellulose, ligno-cellulose, paper, cellulose esters and lacquers, rayons, silk, wool, silk weighting, mordanting, dyeing, felting of wool. [Course IV.]

The Chemistry of Rayon, Its Manufacture, Bleaching, Dyeing and Finishing—C-51. Preparation: C-32. During the past five years the developments of the bleaching, dyeing and finishing of rayon and other manufactured organic fibers, sometimes referred to as synthetic fibers, have been systematically studied and the curriculum of the Chemistry and Textile Coloring course has been revised from time to time to cover the latest developments in regard to these fibers. A complete unit for the actual manufacture of rayon is available for experimental and demonstration purposes, and the course includes laboratory practice in the manufacture of viscose rayon.

Many of the difficulties which arose during the early days of the so-called artificial silk industry were due to lack of knowledge of its properties and more or less persistent attempts to handle it in just the same manner as real silk. As soon as the textile manufacturer began to fully appreciate the fact that the various rayons were entirely different fibers from true silk and consequently must be handled by different methods, then many extensive improvements were made in the processes of manufacturing textiles containing these fibers. In order to satisfactorily handle the different rayons they must receive a preliminary treatment with various oils and softeners, and as a result the problem of establishing the specifications for the best type of oil to use for this purpose and also the best methods of removing it from the material during the finishing process have been important problems in the development of the industry, and these among others are being studied in the Lowell Textile Institute at the present time. [Course IV.]

Elective Subjects or Thesis during fourth year—C-52. Preparation: Satisfactory completion of all first and second year subjects in Course IV. The value of undergraduate thesis work for all students has frequently been questioned. There is no doubt that many senior students might take elective work of an advanced nature to greater advantage than devoting the same amount of time to specific thesis work. With this in mind several electives have been introduced, each elective period being 45 hours per term and four of these being required during the year.

Thesis. If a student has indicated through the first three years of his work that he is capable of handling an original investigation, a definite thesis subject may be assigned to him which will require the entire 180 hours. At the discretion of the Head of the Department, thesis subjects involving one or more elective periods may also be assigned.

In all cases, however, 180 hours' work of an advanced nature, either of thesis work or elective subjects, will be required for graduation.

Photography. A laboratory course in scientific or record photography, including developing, printing, enlarging, preparation of lantern slides, photography of apparatus and procedures, copying, and use of color filters. This course must be taken in preparation for Photomicroscopy.

Photomicroscopy Laboratory. A series of laboratory experiments followed by a research problem in photomicroscopy. The optical system, exposure, and use of color filters is studied and work is done on both fibers and fabrics. Students taking this elective should have had Photography or the equivalent in experience.

Advanced Microscopy. A laboratory course along one or more of the following lines:—

Quantitative microscopy: deconvolution count, classification and grading of wools, quantitative analysis of fiber mixtures.

Polarized light: production, optical effects, uses.

Cross-sectioning: advanced work on methods and refinements in technique.

Colloid Chemistry Laboratory. Experiments illustrating and amplifying the lecture course are performed. These may be on adsorption, hysteresis, surface tension, wetting-out, dialysis, viscosity, protective colloids, emulsification, detergency, gels, swelling, iso-electric point, dyeing.

Textile Chemistry Laboratory. A laboratory course on some branch of textile chemistry of particular interest to the student. This course is usually in the form of directed research.

Microbiology I. This course gives a general survey of the effect of the various micro-organisms on textile materials. Consideration is given to the methods of studying molds and bacteria and the methods of preventing their growth on textiles. In the laboratory the isolation, identification and properties of the organisms are studied. The detection of micro-organisms on fibers and damage to fibers caused by their growth is studied in detail. Methods of testing antiseptics to be used on textiles are also studied.

Microbiology II. A continuation of Microbiology I, laying special emphasis on the branch of microbiology in which the student is most interested. No lectures are given but each student is required to do certain reading and frequent conferences are held with the instructor. In the laboratory each student selects some problem and works it out as thoroughly as time permits.

Rayon. Advanced study of rayon dyeing.

Physical Chemistry. Measurement of molecular weights, heats of reaction, vapor pressure, surface tension, hydrogen ion concentration, electrical conductivity, etc.

Advanced Preparative Chemistry. The student is required to carry through certain preparations starting with a weighed minimum and handing in a weighed product. The preparations are so chosen as to review the principles of inorganic chemistry and at the same time develop the student's laboratory technique. By basing the grade on quantity as well as quality of product obtained, careful technique is encouraged. Conferences and quizzes are given before and after each preparation. The student is constantly required to apply the principles of previous lecture courses in analytical, inorganic and physical chemistry.

Textile—Chemical Engineering—Preparation: B-11, B-12, B-13, B-23, C-20, C-24, C-42. A combination of lectures and laboratory work designed for the study of the thermal properties of fluids, laws of thermo-dynamics as applied to batch and flow processes, flow of heat, mechanical mixtures, and heat engines.

This course will include such practical applications to the dyeing, printing, and finishing branches of the textile industry as efficient use of steam in heating dye

kettles—steam traps—measuring of steam used—calculating steam costs—study of best methods of piping steam for manufacturing purposes and economics of hot water storage.

Compression and fluid handling, testing of pumps, fans and similar chemical engineering equipment including some calibration of instruments will serve to give the student a general over-view of elementary chemical engineering.

Glass Blowing. A course in the elements of laboratory glass blowing, designed to give the man going into laboratory work a familiarity with the methods of handling both soda glass and Pyrex. All the ordinary seals and joints used in construction of apparatus are described and tried out in the laboratory.

Leather Chemistry. This course deals with the chemistry and technology of leather manufacture as well as with the fundamental chemistry of proteins and enzymatic action. It includes the consideration of high molecular weight compounds, the chemistry of fats and proteins, the action of the leather industry including tanning operations, and various applications of analytical chemistry.

Color Matching. A further study of the principles involved in color matching accompanied by actual matching in the dyeing laboratory of many dyed samples of a variety of colors.

Explosives and Chemical Warfare. The history, chemistry, physiological action and military use of the war poisons and of explosives is taken up. The course also treats of the protective measures against chemicals and the tactical use of the weapons.

Advanced Organic Chemistry. This course deals with theoretical organic chemistry and the biochemical aspects of the science such as the isolation, proof of structure and synthesis of physiologically important compounds and the chemistry of synthetic compounds of biochemical interest.

TEXTILE DESIGN AND WEAVING DEPARTMENT—D

Textile Design and Cloth Analysis—D-10. During the first year instruction is given in the subject of classification of fabrics, use of point or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks, stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

This subject takes up in a systematic manner the analysis of samples illustrating the various cloth constructions for the purpose of determining the design of the weave and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric. [First term, all courses.] [Second term, Courses I, II, III, VI.]

Textile Design and Cloth Construction—D-20. For Cotton Goods—Preparation: D-10. During the second year consideration is given to fancy and reverse twills, diaper work, damasks, skip weaves, sateen fabrics with plain ground, backed fabrics, and multiple ply fabrics. Students are required to make original designs and put the same into the loom. Special attention is given to the consideration of color effect.

During the first term free-hand drawing is taught by means of plates, and practice in coloring is given in conjunction with this work.

Practice in lettering, spacing and general arrangement of designs and sketches is given. The engineering alphabet is used in all work.

During the second term instruction is given in drawing, sketching, coloring and designing, with reference to their application in textiles. Good examples of applied design in textiles, as well as in other branches, are used as a basis for modified designs selected and composed by the student. This stimulates originality as well as teaches the student to appreciate good designs and color.

The analysis of these fabrics forms a part of the course in design. This also

includes the necessary calculations required to reproduce the fabric or to construct fabrics of similar character. [Courses I, III, VI, Options C, D, S.]

Textile Design and Cloth Construction—D-21. For Woolen and Worsted Goods—Preparation: D-10. During the second year the instruction given includes warp and filling backed cloth, figured effects produced by extra warp and filling, double cloths, multiple ply fabrics, cotton warps, blankets, bathrobes, crepes, filling reversible, Bedford cords, imitation furs, crepons, matelasse and imitations, double plain, ingrains, velvets, corduroys, overcoatings, trouserings.

The analysis of these fabrics, together with the consideration of the shrinkages and dead loss in all fabrics, theory of diameter of yarns, and costs of blends and mixes is a part of this course. [Courses II, III, VI, W, D, S.]

Textile Design and Cloth Construction—D-22. Preparation: D-10. This is a short course covering the elementary principles of designing in general. Instruction is given in the theory of shrinkages and the lay-out of woolen and worsted fabrics, and at the same time similar instruction is given in the design and construction of cotton fabrics. [Course VI. General Option.]

Jacquard Design—D-23. Preparation: D-10. This course, given during the second term, covers detail instruction of the Jacquard machine and the various tie-ups in common use, the layout for different kinds of fabrics, and the cutting of cards in accordance with prepared designs. The adaptation of various designs to woven fabrics through the aid of cross section paper and its correlation with the different types of looms and Jacquard machines are thoroughly covered. The student is encouraged in original designs and such of these as meet approval are carried out in woven goods. [Course III.]

Power Weaving—D-24. Preparation: D-10. In connection with the work in Textile Design and Cloth Analysis practical work is carried on upon the power looms. This includes the preparation of warps, beaming, dressing, sizing, drawing-in and making of chains, spooling and quilling, and the machinery for the same. A study is made of warpers and sizing machines for cotton, woolen, silk and rayon. Lectures are given to correspond with the progress of the student in the Power Weaving Laboratory covering the following subjects: loom adjustments, chain building, cam looms, automatic shuttle changing looms, dobby looms, single and double acting dobbies, Knowles looms, leno weaving, center selvedge motion, automatic filling changing looms, towel and other pile cloth weaving, Jacquard looms, single and double lift leno Jacquards, Jacquards of special design, the cutting and lacing of cards, and tying up Jacquard harness. The Baker automatic attachment for mixing the filling is also considered. [Courses I, II, III. VI.]

Power Weaving—D-24a. Preparation: D-10. This is a lecture course given during the first term and covers briefly the fundamentals of weaving, types of looms suitable for weaving different fabrics, warp preparation, especially slashing machinery and compounds for rayon, cotton, woolen and worsted yarns. [Course IV.]

Perspective—D-25. Preparation: B-13. A mechanical method of representation.

Textile Design and Cloth Construction—D-30. Preparation: D-20 or D-21. The advanced work takes up the more complicated weaves adapted to harness work, and leads into leno and Jacquard designs. The following is a brief list of the subject heads, which will give some idea of the course: double plain cloths, ingrains, tricots, chinchilla, tapestry, blankets, upholsteries, spot weaves, pile or plush, crepon, matelasse and its imitations, pique, Marseilles, quilting, and miscellaneous designs for Jacquard, leno, fustian, tissue fabrics and lappets.

Original designs and sketches for particular grades of goods and the study of color effects form an important part of the third-year course. It should be understood that work in decorative art is carried on in conjunction with textile construction and weaving, particularly on the Jacquard loom. Designs of merit are carefully developed in detail and woven into cloth.

The work in cloth construction includes the application of the different weaves and their combinations in the productions of fancy designs, both modified and original; the calculation involved in the reproduction of standard fabrics changed to meet varying conditions of weight, stock, counts of yarn and value; and the discussion of the breaking strength of fabrics and relationship of the construction of the fabric to breaking strength.

Instruction in this subject, which is given by classroom work, is intended to bring together the principles considered under the subject of design, cloth construction, weaving and yarn making of previous years, and to show the bearing each has in the successful construction of a fabric. [Courses III, VI, Options D, S.]

Power Weaving—D-32. Preparation: D-20, D-21, or D-23. Instruction is given in weaving on fancy woolen and worsted looms, single and double acting dobbies, leno weaving, double and single lift Jacquard looms, tying up Jacquard harness, leno Jacquard, harness and box chain building; warp preparation for woolen, worsted, cotton, silk and rayon; formulas for making up different kinds of sizing. Lectures are given to correspond with the same. Automatic shuttle changing looms and automatic filling changing looms are taken up as well as the Baker attachment for mixing filling. [Courses I, II, III, VI.]

Color—D-33. A study of color wheels, values and chromas, combinations and proportions as well as color to produce a pleasing effect for the design in question. [Courses I, II, III and VI, Options D, S.]

Principles of Design—D-34. This is in preparation for the Jacquard course. Through the principles of decorative design an understanding is acquired for the proper balance, distribution and repetition of motifs suitable for both the woven or the printed pattern. [Courses III, VI, Options D, S.]

Jacquard Design and Weaving—D-40. Preparation: D-23. Instruction bears particular stress on the sketching of original designs as applied to particular fabrics with reference to the more advanced forms of fabrics and warp tie-ups. In this work the student not only produces his own sketches but must carry his ideas through to the finished fabric. [Course VI, Options D, S.]

Textile Design and Cloth Construction—D-41. Preparation: D-10, D-20, D-21. The work in this course is the application of the instruction received during the three years previous. Particular attention is given to the layout of designers' blankets. Instruction in the production of new designs is given by the use of design suggestion sheets. As in the Jacquard work the student must not only lay out the blankets but must put them in the loom and work out the various effects for himself. [Course VI, Options D, S.]

LANGUAGE AND HISTORY DEPARTMENT—E

English—E-10. Preparation: Admission Requirements. A technically trained man should be able to express himself clearly, forcibly and fluently, as inability to do so will be a serious handicap to him in after life. The object of the English course is to develop the student's power of expression by a thorough study of the principles of advanced rhetoric and composition, and by constant writing of themes illustrative of the four forms of discourse, viz., description, narration, exposition and argumentation. In addition to the study of rhetoric and composition and the writing of themes, several classics such as are not read in the preparatory schools are studied and discussed. [All courses.]

Elementary German—E-11. Preparation: Admission Requirements. This course is intended for first-year students who do not offer German as an entrance requirement and who desire to take the course in Chemistry and Textile Coloring. It may be selected by students taking the Textile Engineering course who have not fully met the entrance requirements in language. The work is elementary in character, and much time is devoted to the study of the rudiments of German grammar with practice in composition. During the latter part of the year considerable attention is given to the reading of ordinary German prose, which serves as an additional preparation to the student for the later reading of works along scientific and industrial lines. [Course IV.]

English—E-20. Preparation: E-10. The curriculum of this course is based upon the sound belief that the young man about to enter business can profit much by the study of the principles and the rules of standard English as applied to business writing. The student is given a comprehensive remedial review of the fundamentals of grammar in their relation to practical expression in writing letters and reports. Class discussions of actual quoted letters, collateral readings, and home

preparation of written assignments afford the student abundant opportunity to enlarge his vocabulary and to improve his style. During the second semester, modern essays and other works of fiction are read and discussed. The course meets twice each week. [Course IV.]

Advanced German—E-21. Preparation: E-11. For students taking the course in Chemistry and Textile Coloring the elementary course of the first year is continued throughout the second year. The work consists of the study of some of the more advanced principles of grammar, and especially of the reading of scientific German, dealing with a variety of subjects, and the translation of commercial German. [Course IV.]

Economics—E-30. Preparation: E-10. This course, meeting three times a week, is conducted by means of lectures, discussions, and recitations, supplemented by textbook reading and study of charts analyzing various phases of industrial problems. The character of the course is descriptive and practical rather than theoretical, and the aim is to acquaint the student with the accepted principles of economics and some of their applications to industrial conditions.

The course will also deal briefly with economic history, showing how the present economic system has evolved from past systems and pointing out how the experience of the past can aid in the solution of present problems.

Besides the historical material, other topics discussed are the nature and scope of economics; the evolution of economic society; the three factors of production, land, labor and capital; the four elements in distribution, rent, wages, interest and profits; business organization; value and price; monopoly; money, credit and banking; international trade; protection and free trade; transportation; insurance; economic activities of municipalities; and public finance. In short, it is an outline course dealing with the fundamental principles that underlie a wide range of activities. [Courses IV, VI.]

Seminar in Business English—E-40. Preparation: E-10. This course is a conference course for those who wish to pursue intensive advanced study in the field of business English. Second semester, one hour each week. [Course IV.]

COTTON YARNS AND KNITTING DEPARTMENT—F

Cotton Carding—F-20. Preparation: B-10, B-12, B-13. This course is given in the first term of the second year and includes instruction regarding the growth, classing and handling of raw cotton and the processes of opening, picking and carding. Considerable time is spent studying cotton production and characteristics so that the student may have a real appreciation of some of the processing problems originating in the cotton itself. The basis of cotton classing is thoroughly covered here and the general background of how cotton is bought and sold is explained.

The mill processes of opening, picking and carding, and the many different types of machines in use are thoroughly studied. Special textbooks with many illustrations have been prepared so that the student may devote his entire attention to class discussions. The calculations pertaining to the various operations are covered in detail. The various settings possible and their effect on quality or production are made clear also.

The laboratory work for this course includes classing practice, fiber study and comparison, waste tests and comparisons, and studies of machine constructions and gearings. [Course I.]

Cotton Carding—F-20a-b-c. Preparation: B-10, B-12, B-13. These courses include the same lectures as course F-20 but the time devoted to laboratory work is reduced progressively in the order given. [F-20a Course VI, Option C; F-20b Courses III, VI, Options G, S; F-20c Course VI, Option D.]

Cotton Carding—F-21. Preparation: F-20. This course, given in the second term of the second year, is a continuation of the work of the first term and includes work on carding, combing, drawing and roving. Here again, special textbooks have been prepared with many illustrations, showing machine cross-sections and details of different actions and parts. While the main part of the work is to clearly explain the purposes and principles of each machine, all the various calculations and set-

things pertaining to each are carefully studied and problems are assigned for student practice.

The laboratory work required in connection with this course includes a series of specific experiments illustrating various phases of the work of each operation. Other laboratory work consists in processing various lots of cotton in preparation for spinning. [Course I.]

Cotton Carding—F-21a-b-c. Preparation: F-20a-b-c respectively. These courses include the same lectures as Course F-21 but the time devoted to laboratory work is reduced progressively in the order given. [F-21a Course VI, Option C; F-21b Courses III, VI, Option G; F-21c Course VI, Options D, S.]

Cottons F-22. Preparation: F-20 taken simultaneously. This course consists of lectures and laboratory work, supplementary to Course F-20, for those students who study cotton only. Some time is spent on the details of cotton fiber growth and structure and in comparing cotton with other fibers. The economic importance of cotton is studied and sources of information regarding cotton and its processing are given to the class. [Courses I, VI, Option C.]

Cotton Waste Processing—F-23. Preparation: F-20, F-21. For those specializing in Cotton Manufacture, this course provides a survey of the methods and machinery used in processing cotton wastes, or new cotton handled on waste machinery. The lectures consider the sources of the various wastes, their preparatory treatment and the manufacturing processes. Samples of wastes and products are used to demonstrate the possibilities in this field.

The laboratory work of Courses F-20 and F-21 provide practice with some wastes and their processing. [Courses I, VI, Option C.]

Cotton Spinning—F-30. Preparation: F-21. This course is a continuation of the study of yarn manufacture and covers the many types of regular and long draft spinning. Such details as spindles, rings, travelers and builders are carefully explained and such factors as twist, contraction and strength of yarns are thoroughly studied. Particular consideration is given to the production of yarns for different uses and how desired characteristics may be obtained. All the calculations regarding yarns and spinning frames are thoroughly studied and problems are assigned for student practice.

The laboratory work for this course includes a series of specific experiments and tests illustrating important phases of the operations and practice in spinning various counts from roving which the students have made previously. [Course I.]

Cotton Spinning—F-30a-b. Preparation: F-21a and F-21b-c respectively. These courses include the same lectures as Course F-30 but the time devoted to laboratory practice is shortened in different degrees. [F-30a Course VI, Option C; F-30b Courses III, VI, Option G, D, S.]

Cotton Winding and Twisting—F-31. Preparation: F-30. This course is a continuation of the course on spinning, in which the instruction includes the conclusion of spinning, spooling and the various types of winding, twisting of common and fancy yarns and such incidental features as reeling, baling, mule spinning and rope manufacture. (Some of these items are optional.) All the calculations regarding winders and twistors are thoroughly studied and problems are assigned for student practice.

The laboratory work includes specific studies, experiments and yarn analyses. Other work required involves the winding of yarns under various conditions and the production of plied yarns to meet specified construction. [Course I.]

Cotton Winding and Twisting—F-31a-b. Preparation: F-30a-b respectively. These courses include the same lectures as Course F-31 but the time devoted to laboratory practice is shortened in different degrees. [F-31a Course VI, Option C; F-31b Courses III, VI, Option G, D, S.]

Cotton Quality Control—F-32. Preparation: F-21, F-30, or F-21a, F-30a. While it is customary to point out defects in the materials during the processing in all the laboratory work, this course provides a logical summary of the usual defects which appear in different stages of cotton manufacture. The student is taught to recognize defective work and is given the usual causes of the common defects. The usual procedures and methods necessary to avoid or correct the defects are ex-

plained. Many samples of defects are used to illustrate this course. Every effort is made to develop the student's diagnostic ability so that he may readily recognize and remedy new defects as he meets them. [Courses I, VI, Option C.]

Staple Fiber Manufacture—F-33. Preparation: F-21, F-30, or F-21a, F-30a. Using the preparatory courses as a background, this course offers a study of the methods of manufacture of various staple fibers, such as wool, rayon or the new synthetics, on regular or modified cotton machinery. As this is a rapidly changing field, the course is planned to take advantage of the new developments as they appear. Considerable of the work in this course is of the discussion type, which aims to correlate all the work on yarn manufacture and bring it to bear on the processing of staple fibers. [Courses I, VI, Option C.]

Cotton Organization—F-34. Preparation: F-21, F-31a or b. This course correlates all the work on Cotton Manufacturing. Starting with a study of actual mill organizations the class is carried forward to problems in developing new organizations for specific types of products. The adaptations for long draft and the handling of staple fibers are carefully covered. The machinery necessary to keep plants in balance is calculated, with some consideration of the best arrangements for economical handling. Some time is given to the use of efficiency work and end breakage studies for cotton mills. [Courses I, VI, Options G and C.]

Thesis—F-35. Preparation: F-21, F-30. Each student is required to present a thesis which is a report of some original work. In some cases this is the production of some yarn or fabric to meet certain requirements. In other cases, the thesis is a study of some technical problem regarding the effect of certain changes in manufacturing conditions. [Course I.]

Knitting—FK-20. Preparation: B-12, D-10. This course, which is given in the second term of the second year for certain options of the engineering course, covers the first half of the lectures and laboratory work given in Course FK-30. [Course VI, Options D, G.]

Knitting—FK-30. Preparation: B-12, D-10. This course is a broad survey of the important types of knitting. Considerable stress is placed on the various stitches and the characteristics of fabrics from each. Starting with flat machines, the work advances through small ribbers, automatic hosiery machines, full fashioned hosiery machines, underwear machines and warp knitters. The analysis of knit fabrics and the classifications and routines for manufacture of hosiery and underwear are included.

The laboratory work consists of a series of carefully organized experiments in which the students operate standard machines to produce some knitted article or fabric. Auxiliary equipment for transferring, looping and sewing is available if needed. Fabric and hosiery analysis are included in this work. [Courses I, II, VI, Options C, W.]

Knitting—FK-30a. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but does not include any laboratory work. [Course VI, Option G.]

Knitting—FK-30b. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but has only one-half the laboratory time. [Course VI, Option S.]

Knitting—FK-31. Preparation: FK-21. Given in the first term of the third year, this is a continuation of Course FK-21 and completes the work given as lectures and laboratory in Course FK-30. [Course VI, Options D, G.]

Knitting—FK-40. Preparation: FK-31. This is an advanced course for students who are specializing in knitting. With the approval of the department, the student may select a particular field from the various sections of the knitting industry and concentrate on its problems. [Course VI, Option G.]

WOOL DEPARTMENT—G

Fiber Preparation—G-20. Preparation: B-10, B-12, B-13. **RAW MATERIALS.**—A study of raw materials which enter into the manufacture of woollen or worsted yarns, or which are made into yarns by processes similar to those em-

ployed in the manufacture of woolen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel's hair, cotton, flax, hemp, jute, ramie and cut staple.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lecture and by actual sorting of fleece wool under the direction of an experienced wool sorter. The various characteristics and properties are explained, as are also trade names, such as picklock, XXX, XX, $\frac{1}{2}$ -blood, $\frac{3}{8}$ -blood, $\frac{1}{4}$ -blood, delaine, braid, etc. Some skill is acquired in the estimation of shrinkage and in judging the spinning qualities.

WOOL SCOURING.—The object of scouring and the methods employed are explained, and this involves the consideration of the soaps and chemicals used in scouring; also the waste products and their utilization. Actual work is done in scouring a commercial quantity of wool by machines that are made similar in operation to regular commercial machines. At the same time the use of dryers, their operation and regulation is taken up.

CARBONIZING.—The various methods of stock carbonizing are explained in detail in the lecture course. Actual carbonizing of noil, burr waste, and defective wool is carried out by the sulphuric acid method on commercial size machines in the laboratory.

TOP MAKING AND COMBING.—This branch takes up in all detail the carding of wool on a worsted card, the preparing processes, back-washing and Vigoureaux printing, also gilling of the stock before and after combing. The construction of the gill boxes and combs is studied by lectures and by dismantling and assembling these machines in the laboratories. Later, quantities of stock are made into top and then into yarn.

The Noble comb is studied, and the various calculations to determine draft, noiling, tear, productions, etc., are made. [Courses II, III, VI, Options G, W, D, S.]

Woolen Yarn and Reworked Fiber Manufacture—G-21. Preparation: B-10, B-12, B-13. REWORKED FIBER.—Rags of all kinds are studied, sorted, and all processes necessary to convert them into fiber are covered in detail.

WOOL BLENDING, OILING AND PICKING.—Mixing and shading of colors and qualities of wool are studied and practiced. The details of Burr Pickers and mixing pickers including the Fearnought are studied in full. The importance of oils and emulsions is stressed in lecture and laboratory.

WOOLEN CARDING.—The system of carding wool for woolen yarn is fully explained, as is also the construction, setting and operation of the cards. A part of the work is the reclothing and grinding of the cylinders, strippers, workers, etc. The carding of suitable and commercial quantities of wool, and the further manufacture of it into yarn, serves to fix the principles of carding in the mind of the student, as well as to give him some skill in handling machinery.

WOOLEN SPINNING.—The computations necessary in converting roping into yarn are fully explained. The details of construction and operation of the spring and cam type mule are well covered in lectures and practice. The theory and practice of continuous or ring spinning for woolen is also taken up. The conditioning of yarn after spinning by steaming is explained.

Costs and details of a yarn mill are mentioned in brief as well as some causes of poor yarn and its effect on mill production. [Courses II, III, VI, Options G, W, D, S.]

Worsted Yarn Manufacture—G-30. Preparation: G-20. INTERSECTING GILL BOXES AND FRENCH COMB.—The equipment of the laboratory offers opportunity for the production of dry-combed top and its comparison with oil-combed top produced on the Noble comb. The structures and uses of intersecting gill boxes and the study of combing and drawing blends is taken up at this point.

DRAWING AND SPINNING.—The laboratory equipment consisting of the Bradford (English) system of drawing, of both open and cone types, as well as the various processes of French drawing, followed by both worsted mule and ring spinning frame, make possible a thorough study of the manufacture of worsted yarn by all of the existing methods.

The same method of study of mechanisms, calculations, and operations of the

various machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

ORGANIZATION.—At the end of the course the layout of a properly balanced yarn mill is studied, and at the same time the cost of machinery, depreciation, labor costs and machinery arrangements.

THESIS.—Before graduation the student must present visible evidence of his knowledge of woollen and worsted manufacture by the production of twenty yards of fabric from his own design (or reproduction or modification of some existing fabric) beginning with the raw material.

A formal typewritten description, including all calculations and observations, together with samples from each machine, must be presented to the head of the department before the final examination. [Courses II, III, VI, Options G, W, D, S.]

Technology of Wool Manufacture—Lectures and Demonstrations—G-40. Preparation: C-21, C-32, D-10. This course is planned to supplement the instruction already given in design, cloth construction, chemical technology of fibers, scouring, dyeing and finishing, with sufficient lectures and demonstrations in sorting, scouring, backwashing, gilling, combing, top-making, English drawing, spinning, twisting, warping, and weaving, to make the processing of grease wool and allied fibers into ordinary worsted spun yarn fabrics, clear as to object and continuity.

The manufacture of virgin and reworked wool into woollen spun fabrics, with scouring, carbonizing, mixing, picking, carding, spinning, twisting, warping and weaving is also given. Illustrated descriptions of the manufacture of hardened, woven and needle loom felts are taken up.

Mechanical details and calculations are subordinated to familiarizing the student with the nature and object of the several processes. [Course IV.]

FINISHING DEPARTMENT—H

Woollen and Worsted Finishing—H-30. Preparation: B-12, C-10, D-10, D-24. The outline of this course, which is given by means of lecture and laboratory work, is as follows:—

BURLING AND MENDING.—Under this head is taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are all considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the early types of stocks, hammer falling and crank stocks, and their modifications and development into the present type of rotary fulling mills of both the single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, methods of covering, regulation and means of adjusting the pressure of traps and rolls, consideration of the shoes, the use and regulation of the various types of stop motion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hydroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the reduction of various degrees of felt as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The

manipulation of the various kinds of goods in the mill, viz., all wool, shoddies and mixed goods, is studied in classroom and by operation in the mill.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods both before and after the fulling process: the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and scours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions, and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING, STEAMING, SINGEING AND CRABBING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing, and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year. [Courses II, III, IV, VI, Options G, W, D, S.]

Cotton Finishing—H-31. Preparation: B-12, C-10, D-10, D-24. The outline of the course in the finishing of cotton fabrics is as follows:—

CLOTH ROOM.—Instruction of the various goods and the object thereof; construction of the various types of inspecting and trimming machines.

SHEARING.—The object. A consideration of the various types of shears for treating one or both sides at the same time; also the use of the usual cleaning devices, such as emery, sand and card rolls, beaters and brushes; grinding and the adjustment of the various parts.

The use of brushing and cleaning machines, rolling devices and calender attachments for gray goods.

SINGEING.—Developing and object of singeing; the construction of singers of all types and for various purposes; the use of cooling tanks; steaming devices, rolling and brushing attachments.

Regulation of the flame for various goods, and adjustment of the parts; gas and air pressure, water-cooled rolls; the effect of moisture on the cost of singeing and use of dry cans in connection with singeing; electric singeing.

WASHING.—Open width and string washers, their construction and operation; soaps, temperature, squeeze rolls; washing of various goods and the object thereof; stains.

NAPPING.—The object of napping and the usual method of treating goods; various types of nappers, single and double acting; felting nappers; construction, grinding and adjustments of various types.

WATER MANGLES.—Their objects and the construction of various types; various rolls, iron, husk, etc.; scutchers, their object and constructions.

STARCH MANGLES.—The object and construction of all types of starch mangles for pure starch and filled goods; various types of rolls, brass, rubber, wood; action of doctor blades, etc.; regulation and object of pressure.

Methods of starching and finishing all standard goods, also a consideration of the various substances used, such as starch, softener and fillers; the preparation of starch and various methods of application.

DRYERS AND STRETCHERS.—Both horizontal and vertical types of drying cans, tenter frames, clips, etc.; the swing motion and the finishes thus produced; object and construction of spraying machines, belt stretchers, short tenters, button breakers, etc.

CALENDERS.—The object and construction of all types, including the regulation of pressure and nips for the production of various finishes; various types of rolls and their uses,—steel, husk, cotton, paper, etc., the use of hot and cold rolls; chasing, friction, embossing and Schreiner calenders, and the various finishes produced by each; production of watered effects; beetling machines and hydraulic mangles.

· Making-up room,—yarding, inspecting; different types of folds: pressing, papering, marking. [Courses I, III, VI, Options G, C, D, S.]

EQUIPMENT

The equipment of machinery, inventoried at \$458,000.00, is most varied for textile educational purposes, and is being constantly augmented. The builders of the various machines installed keep in close touch with the Institute, adding to the machines such improvements as are made from time to time. This operates to the mutual advantage of student and manufacturer.

Cotton Yarn Department.—The opening and picking section of this department contains a 50-saw Pratt gin used for experimental purposes. For classing work, there is a special section with north light, where Universal Standard Grades, Government Staple Standards, and many different commercial cottons, American and foreign, are available.

The picking equipment consists of a 40-inch Saco-Lowell three beater single process picker with a Blending Reserve.

The card section has three standard revolving flat top cards, one each from Saco-Lowell, Whitin, and Howard and Bullough shops.

The combing section consists of a sliver lapper, one four-head ribbon lapper, one two-head comb, and one eight-head comb, all from the Whitin Machine Works. There is also one two-head Nasmith comb from John Hetherington and Sons of England.

For drawing, there is a two delivery Howard and Bullough head equipped with metallic rolls and electric stop motion. From the Saco-Lowell Shops, there is a railway head and two four delivery heads, one of which is equipped with a Chapman Neutralizer.

The roving section has a complete equipment, slubber, intermediate, fine and jack frame from the Saco-Lowell Shops. In addition, there is an intermediate frame made by the Woonsocket Machine and Press Company, and a fine frame from Howard and Bullough.

The spinning equipment is quite varied both with respect to builders and with respect to types and sizes. The Saco-Lowell Shops have supplied five different frames varying from 36 to 216 spindles. They are suitable to spin counts from 3s to 80s. One is equipped with the Saco-Lowell Roth long-draft system. A sixth Saco-Lowell frame was supplied by the Acme Machine Company equipped with Chapman ball-bearing spindles. The Whitin Machine Works is represented by

three frames on which counts from 3s to over 100s can be spun. One of these frames has an auxiliary equipment of SKF roller-bearing spindles and is fitted on one side with Casablanca long-draft equipment. The Howard and Bullough shops have one spinning frame suitable for counts from average to fine. This is equipped with an English type of builder which distinguishes it from the other frames. There are two Fales and Jenks frames. One is equipped on one side with the Casablanca long-draft system, and the other is a 72 spindle frame equipped with the latest Whitin long draft system. An Asa Lees Company mule, suitable for counts above 30's, has been retained to illustrate this peculiar type of spinning.

There is one short spooler from the Saco-Lowell Shops. There are two winders from the Foster Machine Company, one for single ends either on cones or tubes, the other for one, two, or three ends parallel wound, especially for preparation for twisting. There is also a one gang Universal No. 50 winder with individual drive suitable for winding ordinary tubes or Franklin Process packages.

The twistors are suitable for all counts. There is one each from the Saco-Lowell, the Howard and Bullough, and the Fales and Jenks Shops. These are all equipped for either wet or dry twisting of average and fine counts. There are two twistors from the Draper Corporation. These are equipped for wet or dry twisting for coarse counts or heavy plies.

To prepare mill wastes for re-use there is one single cylinder roving waste opener and one thread extractor, both from the Saco-Lowell Shops.

The department has a complete coiler waste system as made by the Saco-Lowell Shops, consisting of a 40-inch single coiler side delivery breaker card; a 40-end derby doubler; a 40-inch four coiler finisher card; a combination slubber-intermediate and a waste spinning frame. The cards are both equipped with Chapman neutralizers intended to overcome any trouble originating from static electricity.

With the exception of the opening-picking room the humidity in this department is controlled automatically by a system installed by the American Moistening Company. Seven high duty heads supply the necessary moisture and air circulation. An adjustable automatic control regulates the humidity to the desired per cent.

The experimental laboratory is equipped with a power driven skein tester for determining yarn strength and a Moscrop single thread tester for single end strength. There are twist counters for determining the amount of twist and the twist contraction. For fine work and for fiber study, there is an analytical balance and a Spencer microscope equipped with three objectives, three oculars, ocular micrometer, mechanical stage and Abbé condenser.

Knitting Section.—The winders for this section include a six-spindle No. 50 cone winder, equipped with swifts for winding from skeins, suitable for fine cotton, worsted, silk and rayon yarns, a Payne bobbin winder suitable for coarse woolen, worsted and cotton yarns, and a Foster winder suitable to wind cones or tubes.

Under the group of flat machines there are three Lamb machines, one arranged for knitting gloves and one arranged for knitting sweaters. In addition to these there is also a Grosser sweater machine, a Jacquard machine, and a link and link machine; two Dubied scarf machines, and a Raschel warp knitter.

In the automatic hosiery machine section are included three Banner machines,—220 and 200 needle full hose machines and a 160 needle half hose machine; four Scott & Williams Machines,—a 200 needle B-5, a 220 needle Model K, a 220 needle HH and a 160 needle RL. This section also includes two Acme stationary cylinder machines and a Mayo model C full automatic. For fundamental instruction a Branson 80 needle hand machine is included. For hosiery legs and tops there are five ribbers, made by the Wildman Company, with cylinders varying from 3-5¼ and arranged for needles varying in number from 100-240; two Brinton ribbers, one arranged for 176 needles and the other 200 needles; one Brinton tie machine, 1¾-inch cylinder 100 needles and 49 needles; one Universal Ribber 3½-inch diameter, 160 needles. To illustrate the fully fashioned type of knitting hosiery there is an 18 section, 39 gauge Reading legger, with topping stand.

The underwear machinery consists of a Scott & Williams ribber, a Wildman ribber, a single head Crane spring needle machine and a two head Tompkins spring needle machine. Melting pots and molds are available for leading needles.

For finishing work this section includes a Grosser 2-thread looper, one Hepworth looper, two Beattie loopers, a Soteco 20-point looper with an individual table and motor drive; five Union Special sewing machines for overseaming, double stitch covering, seaming and welting and vest finishing; seven Merrow sewing machines, including one shell stitch machine and three overseaming and crocheting machines; three Singer machines; three Wilcox & Gibbs sewing machines, including a flat-lock machine.

The Philadelphia Metal Drying Form Company has installed a table of six forms including men's, women's and children's.

For instruction in the manufacture of braids the New England Butt Company has installed one 24-line Hercules braider, one 12-line braider, one tubular braider, and one soutache braider.

Wool Yarn Department. — The following machinery and equipment is available for use in the manufacture of yarn on the woolen principle.

Installed by Davis & Furber Machine Company: One wool mixing picker equipped with hooper feed (George S. Harwood & Son), one modern 60 x 40 three cylinder set of cards with Garnet Breast, single breaker and double finisher, each driven by Westinghouse variable speed motors through silent Whitney chains, improved Bramwell breaker feed by Harwood & Sons, Davis and Furber Broadband intermediate feed and 80 end four bank single apron tape condenser with all change gears and pulleys; one set 48 x 40 cards with single breaker, intermediate, and finisher cylinders, Bramwell breaker feed, latest type Apperly-Harwood transfer feeds with 40 end ring doffers and two apron condenser; one Model B woolen ring spinning frame, motor driven, with 60 spindles $2\frac{1}{2}$ -inch rings; one 120 spindle spring mule with bobbin holders by the American Bobbin Holder Company; one 20 spindle $2\frac{1}{2}$ -inch ring twister for novelty yarns.

Installed by C. G. Sargent's Sons Corporation: One multiplex burr picker for medium wools, one yarn conditioning machine with motor drive.

Installed by Johnson and Bassett, Inc.: One 120-spindle cam mule complete.

Installed by Torrance Manufacturing Company: One sample mixing card for blending and matching wool.

Installed by B. S. Roy & Son: One card grinding stand with two traverse grinders complete.

Reworked Fiber Division. — Installed by C. G. Sargent's Sons Corporation: One cypress screw acid dip tank; one single apron dryer (baker); one cone carbonizing duster with crush rolls.

Installed by Schaum & Uhlinger, one steam hydro-extractor.

Installed by C. S. Dodge of Lowell, one ball bearing rag picker with condenser, one bagging stand.

Installed by John T. Slack Corporation are many samples of reworked wool in all stages from rags to fiber.

Wool Preparing Division. — Wool sorting and grading is carried on under excellent conditions with the following equipment: sorting bench, baskets, bagging stands.

Installed by C. G. Sargent's Sons Corporation: One grease wool cone duster, one four bowl scouring train with large hopper feed; one single apron dryer with large feeder.

Many samples of all types of wool are available for study.

Top Making Division. — Top for the Bradford or French system is made with the following machinery: One double cylinder worsted card (four licker-in) with can coiler and balling head, complete, by Davis & Furber Machine Company, and with a Bramwell automatic feeder supplied by George S. Harwood & Sons. An electric neutralizer is furnished on card by the Chapman Electric Neutralizer Company. This section also includes a double bowl, 5-cylinder backwasher, with gill box, Taylor-Wordsworth & Co., equipped with blueing motion, oiling motion, and Layland patent pressure motion; a weigh gill box and creel and one doubling balling head gill box (with double screws) made by the Saco-Lowell Shops; two worsted combs with baller punch, one made by Crompton & Knowles, and the second made by James Smith & Sons; two finishing gill boxes, one known as a can gill box and the other a balling head gill box, both made by Hall & Stells.

Worsted Yarn Division.—Bradford or English System: For the manufacture of yarns under the Bradford System of Drawing, Spinning, and Twisting, the following machinery as made by Prince Smith & Son, make up the equipment: one revolving creel for 12 balls, one 2-spindle drawing box, one 4-spindle first finisher, one 12-spindle dandy reducer, one 12-spindle cap frame, one double head can gill box, one 2-spindle gill box, one 2-spindle flyer frame, one 12-spindle ring frame, one 12-spindle 2-fold cap twister, one 12-spindle 6-fold ring twister. One 36-spindle ring spinning frame with motor drive has been installed by Whitin Machine Works. In addition to this the Saco-Lowell Shops have installed the following machinery to carry on similar work: one 2-spindle drawing box, one 6-spindle second finisher, one 24-spindle dandy rover, one 6-spindle cone reducer, one 8-spindle cone rover, one 48-spindle cap spinner, 5-foot end, one 48-spindle cap spinner, 4-foot end, one 48-spindle Boy ring twister. The Universal Winding Company has installed one of its 6-gang winders, equipped for cones or straight tubes. The Lindsay-Hyde Company has installed a modern skein winder.

The humidity in the laboratory as well as in the testing laboratory of the woolen yarns and of the English system of worsted yarns is maintained by the American Moistening Company's system of six humidifiers and four Comin's High Duty heads, under automatic control.

French System.—For the manufacture of worsted yarns under the French System of Drawing and Spinning the machinery was made by the Société Alsacienne de Constructions Mécaniques, and the equipment consists of the following: Model P. L. B. comb with creel for 24 doublings, intersecting gill box (2 heads) equipped with oiling device, gill box (2 heads), first drawing (2 heads), second drawing (2 heads), third drawing (2 heads), reducer (4 porcupines), slubber (8 porcupines), first intermediate (8 porcupines), second intermediate (8 porcupines), rover (8 porcupines), finisher (16 porcupines), self-acting worsted mule (150 spindles).

The Saco-Lowell Shops built and installed a ring spinning frame of 60 spindles for worsted yarns equipped with individual General Electric Company's motor and a Reeves Variable Speed Transmission.

Twenty-one turbo humidifier heads automatically controlled by a humidity regulator have been furnished by the G. M. Parks Company. The compressed air for these heads is supplied by an Ingersoll-Rand 8 by 8 steam-driven air compressor.

Testing Equipment.—For routine mill and research testing a conditioning room is provided which is humidified by G. M. Parks Company equipment.

Testing machines include the following: Henry L. Scott & Company skein and fabric tester; one Emerson conditioning oven with Toledo scales; one Bausch & Lomb projecting microscope for fiber analysis; one Alfred Suter top stapling machine with scales; one top inspection stand with duplex mercury lamp lighting; one Edgerton stroboscope; five copper bowls for scouring by hand; complete set of U. S. wool standards for fiber comparison.

Design and Power Weaving Department.—In the fabric analysis section there have been provided chemical balances made by Volland & Sons and Christian Becker, necessary twist testers, microscopes, reels, etc., as well as a Torsion calculation balance made by the Torsion Balance Company.

In the warp preparation department there has been installed by the Saco-Lowell Shops one of its spoolers, and a slasher for preparing cotton warps; also a high speed warper, by T. C. Entwistle Company. The Whitin Machine Company has supplied a 180-spindle, long chain quiller, and the Johnson & Bassett Company, a quiller of its make. The Universal Winding Company has supplied a winder for cop and bobbin winding and an 8 spindle doubler, also a winder for the high speed warper.

The woolen and worsted warp preparation department contains two 40-end jack spoolers, two spool racks for 12 spools each, one pattern dry frame dresser, one pipe and cylinder dresser, one 60-inch reel, one 82-inch reel, and one double head beamer, all supplied by the Davis & Furber Machine Company.

The Weaving Department contains four looms supplied by the Draper Corporation, which include a plain Northrup, an 8-harness corduroy, an improved Northrup, a Northrup with dobby. The Stafford Loom Company has installed one plain, one cam, one dobby loom and one broad sheeting loom, all equipped with

individual motors; the Whitin Machine Works, a side cam twill, a plain print cloth loom, equipped with Kip-Armstrong electric warp stop motion; Crompton & Knowles Loom Works a jean loom and a plain loom with individual drive. Four of these looms are equipped with Abbott cleavers made by the Abbott Wire and Cast Steel Warp Cleaving Company. The Hopedale Manufacturing Company installed one of its high speed looms with individual motor.

The fancy loom section includes a Stafford Ideal 16-harness automatic shuttle-changing loom, a Whitin 20-harness dobby loom, and the following furnished by the Crompton & Knowles Loom Works: Knowles gingham 4 by 1 boxes, Crompton gingham 4 by 1 boxes, one Crompton towel 2 by 1 boxes, two Terry towel and one huck towel looms, a 20-harness dobby 4 by 1 boxes, fancy leno loom, and a Crompton fancy cotton single cylinder 20-harness dobby.

The woolen and worsted section contains a Knowles 20-harness Gem, a Crompton 24-harness worsted 4 by 4 boxes, a Crompton 6 by 1 double cylinder 20-harness dobby, one heavy 20-harness 4 by 4 boxes, one 20-harness and one 25-harness blanket, seven intermediate woolen 25-harness 4 by 4 boxes and two 90-inch 25-harness heavy woolen looms.

The Jacquard loom section includes one Stafford silk loom, 1,200-hook, Halton head; one 400-hook, single-lift Schaum & Uhlinger Jacquard, mounted for 4-bank, narrow fabric loom; one Skinner Brussels carpet loom, three-quarters wide, equipped with 1,280-hook Jacquard head presented by the Bigelow-Hartford Carpet Company. The Crompton & Knowles Loom Works has furnished one Knowles fancy loom, single-lift Jacquard; one Knowles fancy loom, double-lift Jacquard; one Knowles fancy loom, Jacquard tied up for leno, one Knowles loom, 4 by 4 boxes, 54-inch, with 600-hook, double-lift, double-cylinder McMurdo Jacquard head, tied up for damask napkin designs; one Crompton & Knowles 72-inch tapestry loom, with 2,600-hook Halton Jacquard head, one 840-hook, double-lift, single-cylinder Jacquard on Crompton & Knowles 4-bank ribbon loom, one 800-hook, double-lift Knowles Gem silk brocade Jacquard machine, 4 by 4 boxes.

The silk loom section includes one Stafford silk loom, 20-harness dobby, 2 by 1 box motion, sliding bar warp stop motion, filling feeler, extended beam stands, motor drive; one Crompton & Knowles silk loom, 4 by 4 box motion, 20-harness head motion, individual motor drive.

For the purpose of card cutting there has been furnished one Jacquard fine index card-cutting machine by John Royle & Sons; one Jacquard French index card-cutting machine by the same concern.

Chemistry and Dyeing Department.—The Chemistry Laboratory consists of one to give instruction in General Chemistry and Qualitative Analysis and provides facilities to take 120 students. The Quantitative Laboratory takes care of some 50 students and contains the necessary drying closet, steam bath, electrolytic table. The Balance Room has eleven analytical balances made by such concerns as Christian Becker, Eimer & Amend, and H. L. Becker's Sons & Company. The Organic Laboratory has facilities to take care of approximately 25 students having the necessary equipment required in the preparation of basic organic compounds and instruments used in the manufacture of dyes such as autoclaves, electric and gas combustion furnaces.

The Engineering Chemistry Laboratory contains the following equipment: a Becker chainomatic Westphal balance, a Stormer viscosimeter, a Doolittle viscosimeter, an Engler viscosimeter, Saybolt viscosimeters, Pensky-Martin flash tester, Cleveland open cup flash tester, Mahler oxygen bomb calorimeter, Emerson oxygen bomb calorimeters, Parr peroxide bomb calorimeter, Parr sulphur bomb, New York State closed testers, carbon residue apparatus, Orsat flue gas apparatus, Hempel gas analysis apparatus, and the usual chemical apparatus and analytical balances.

The Chemical Textile Testing Laboratory contains the following: a Scott serigraph strength tester, a Scott single strand strength tester, a Freas drying oven and Becker analytical balance for moisture determinations, a mercury arc lamp for ultra violet, a fadeometer, a launderometer, yarn reels, a twist counter, an extraction apparatus, a centrifuge, a Scott regain indicator, a barometer, a Hygrodeik hygrometer, Sling psychrometers, a DuNuoy tensiometer, a Zeiss dipping refrac-

tometer, an Abbé fractometer, a Gaertner spectroscope, a polariscope, a MacBeth color matching lamp, a Mackay cloth oil tester, a Duboscq colorimeter, a Lovibond tintometer, and the usual chemical apparatus and analytical balances.

The Microscopy Laboratory has been equipped with the following: a polarizing chemical microscope, twelve ordinary microscopes, a Minot rotary microtome, a Spencer table microtome, a Zeiss comparison ocular, Chalet lamps, individual lamps, Silvermann illuminators, mechanical stages, dark ground illuminators, a vertical illuminator, a camera lucida, polarizing equipment, an arc lamp, stools, microscope tables, and the usual auxiliaries.

The Microbiology Laboratory contains in addition to microscopes, lamps and other individual equipment, a horizontal gas heated autoclave, a small vertical autoclave, two electric incubators, a sterilamp unit, an electric oven, balances, including a chainomatic analytical balance, and a high vacuum unit for micro-aerophilic experiments. Small equipment such as electric slide warmer, electric hot stage, etc., is also included.

The Photography and Photomicroscopy Laboratory equipment is as follows: Bausch and Lomb horizontal photomicrographic apparatus, Leitz vertical photomicrographic apparatus, Lucas vertical photomicrographic apparatus, Wratten filters, Klieg lamps, dark-room lamps, a projection printer, a graphic camera with focal plane shutter; also much small apparatus such as tanks, trays, washers, etc.

The Chemical Museum has been provided with cases and representative dye-stuffs all furnished by various dyestuff manufacturers of this country and abroad. This offers an unparalleled opportunity for students to study and experiment with almost all of the representative dyes which are used in the textile industry.

The Experimental Dyeing Laboratory is equipped with fifty-six steam heated dyeing baths and individual benches, reels and balances. There is also an ageing chamber and a Philadelphia Drying Machinery Company's Hurricane Dryer besides a large collection of dyestuffs.

The Experimental Printing Laboratory is equipped with a power-driven, full-sized, two-roll calico printing machine, and a smaller one-roll, power-driven printing machine, both made by Rice, Barton & Fales, and a small hand-driven, laboratory printing machine, an iron-jacketed steaming chamber, and a set of steam-jacketed copper kettles.

To give instruction in dyeing on a basis which is more comparable with commercial practice there is provided a laboratory which includes the following equipment: a small kier, fitted with E. D. Jefferson's circulating device, a Permutit filter; a mercerizing machine, raw stock and yarn dyeing machines, Klauder-Weldon Dyeing Machine Company; a jig dyeing machine; a set of drying cans; a chain dyeing machine; a raw stock drying table; a padding mangle; a hydro-extractor; a Psarski experimental dyeing machine, a Hussong experimental dyeing machine, equipped for raw stock or yarns, a Rodney Hunt sample piece dyeing machine, equipped with an automatic temperature and pressure-regulating apparatus, made by C. J. Tagliabue Manufacturing Company. The Franklin Process Company has furnished a 25-pound bronze dyeing machine.

Finishing Department.—The Woolen and Worsted section includes a motor-driven Clipper cloth 4-string washer, a fulling mill, and a combination fulling and washing mill for jersey fabrics, furnished by the Rodney Hunt Company; a sample fulling mill, a kicker mill, furnished by James Hunter & Company; an up and down dry gig, a rolling and stretching machine, an up and down wet gig, a steam finishing machine, a 60-inch, 3-burner singeing machine, adapted for cotton, silk or worsted goods, a 2-cylinder double-acting brushing machine. Curtis & Marble Machine Company has furnished a 60-inch 4-cylinder sanding and polishing machine; a mantle steaming and air cooling machine, equipped with a direct connected motor and a Nash pump; and a 66½-inch motor driven, single woolen shear, equipped with list saving motion; a 6-4 double shear, an A. W. C. measuring and weighing machine, furnished by Parks & Woolson; a dewing machine, a 6-4 Voelker rotary press, furnished by G. W. Voelker & Co.; a tentering and drying machine furnished by John Heathcote; a single crabbing machine, H. W. Butterworth & Son; a 72-inch woolen napper donated by Davis & Furber; a 32-inch basket hydro-extractor, W. H. Tollhurst; a Lintz & Eckhardt cloth numbering machine, from Durbrow & Hearne Company; a steam press for underwear, United States Hoffman

Company; a sewing machine, Birch Brothers; a trimming and overseaming machine, The Merrow Machine Company.

The Cotton section includes a 40-inch inspecting and brushing machine, a 44-inch No. 25 railway sewing and rolling machine, a 44-inch cotton shearing machine, Type No. 34, a 44-inch No. 3 steam calender rolling machine, a 40-inch cloth folder, a 40-inch winder and measurer, a set of 44-inch shear blades for grinding purposes, furnished by Curtis & Marble Machine Company; a 48-inch No. 4 opening, sewing and rolling machine, a No. 1 hand power portable railway sewing machine, furnished by Dinsmore Manufacturing Company; a 40-inch 4-tank open soaping machine equipped with patent flushing rolls, brass and rubber squeeze rolls and spiral openers, furnished by Birch Brothers; an 80-inch 24-roll, ball bearing, double acting napper, equipped with a $7\frac{1}{2}$ -horsepower General Electric motor drive, furnished by Davis & Furber (the ball bearings were donated by the Fafnir Bearing Company); a 40-inch, 3-roll water mangle, with husk and brass rolls and usual attachments and equipped with a 48-inch Mycock scutcher, and a 40-inch Mycock cloth expander made by Thomas Leyland & Company; a 40-inch, 2-roll starch mangle, a 40-inch upright drying machine with 10 copper cylinders equipped with Files dry can system; a 40-inch sprinkler, a 40-inch, 5-roll Universal calender with chasing attachment and equipped with a 40-inch Mycock cloth expander, a pasting table with plate, furnished by the Textile-Finishing Machinery Company; a 16 by 24 inch bronze-covered stretcher for the drying cans, C. A. Luther & Company; a 40-inch double bristle stretcher for drying cans, American Finishing Machinery Company; a trimming and overseaming machine, The Merrow Machine Company; a 40-inch Tommy Dodd starch mangle, and a 44-inch, 50-foot vibratory centering machine, H. W. Butterworth & Sons Company. This machine is directly driven by a $7\frac{1}{2}$ -horsepower variable speed motor and is equipped with a Schwartz automatic electric guider, made by L. H. A. Schwartz & Company.

Engineering Department.—The Steam Engineering Laboratory contains the following equipment arranged for experimental purposes: A 50-horsepower Allis-Chalmers Corliss steam engine direct connected to an Alden absorption dynamometer, and piped to exhaust its steam to the atmosphere, to a Wheeler surface condenser or to the Kerr turbine; a Kerr seven-stage turbine driving directly a 25-kilowatt Richmond Electric Company's alternating current generator and piped to exhaust either to the atmosphere or the condenser. It may be operated either as high pressure or low pressure turbine, and the generator has special connections to illustrate various commercial phases. In addition there are a 4 by 6 Deane triplex power pump, two 2-inch centrifugal pumps made by Lawrence Machine Company, Lawrence, Mass., a Clayton air compressor and necessary tanks, scales and measuring instruments.

The Electrical Engineering Laboratory consists of two sections, one of which is devoted to instruction in the generation and transmission of power, and contains the necessary switchboard and instruments to control a 25-kilowatt alternating current turbo generator and a 15-kilowatt motor generator set arranged to supply either direct or alternating current. In addition there are a 24-horsepower direct current Allis-Chalmers motor and a 10-horsepower direct current General Electric motor, also a 10 and a 7.5 horsepower General Electric alternating current motor besides a General Electric 3-kilowatt rotary transformer and three Westinghouse stationary transformers. The other section is the instrument laboratory and is for the purpose of giving instruction in the measurement of current, voltage, resistance, and in the calibration of instruments. It is supplied with standard alternating and direct current measuring instruments of a wide range of sizes and capacities. A 160 ampere hour storage battery offers a source of constant voltage. A standard Leeds & Northrup photometer with Lummer-Brodhun screen and Macbeth illuminometer provide means of illumination measurements.

Machine Shop.—The equipment of the machine shop is as follows: Four standard engine lathes, 13-inch swing, 6-foot bed, and an engine lathe, 18-inch swing, 10 foot bed; three standard engine lathes, 14-inch swing, 6-foot bed, from Flather & Company; a standard engine lathe, 15-inch swing, 6-foot bed, from F. E. Reed Company; an engine lathe, 18-inch swing, 6 foot bed from Champion Tool Works; a standard engine lathe, 15-inch swing, 6-foot bed, from S. H. Putnam

Sons; one No. 1 Universal milling machine, with all three feeds automatic, from Kemp Smith Manufacturing Company; one 24 by 24 inch, 6-foot planer, from the Mark Flather Planer Company; one 23-inch upright drill, with back gears and power feed, from J. E. Snyder & Son; one 14-inch single sensitive drill, from the Stanley Manufacturing Company; one No. 1 Universal grinder, from Landis Tool Company; five speed lathes, 17-inch swing, 5-foot bed, one 20-inch wet tool grinder, and one 12-inch, 2-wheel dry grinder, from J. G. Blount; an American twist drill grinder, from the Heald Machine Company; one Type 1B portable electric grinder from the Cincinnati Electric Tool Company; one 30-inch grindstone and frame, from the Athol Machine Company; a single spindle centering machine, from D. E. Whiton Machine Company; one 15-inch shaper, from Potter & Johnson; one power hacksaw, from the Fairbanks Company; one cold saw, from John T. Burr & Son; one Eureka metal power saw, Manning, Maxwell & Moore; one Type CC electric drill, Cincinnati Electric Tool Company; one Universal milling attachment for Kemp Smith milling machine, and one Hisey Type B $\frac{1}{2}$ -horsepower tool post grinder, Taylor Machinery Company; one No. 2 Cory bench straightener, Manning, Maxwell & Moore; one No. 3 Universal cutter and reamer grinding machine, Browne & Sharpe; a well-equipped tool room containing a selected stock of the best makes of small tools, such as drills, taps and dies, milling cutters, reamers, gauges, micrometers, etc.

PRIZES AWARDED IN JUNE, 1942

The National Association of Cotton Manufacturers offers a medal to that member of the graduating class who maintains the highest standing throughout his course in Textile Engineering (General or Cotton Option) or the course in Cotton Manufacture. To *Robert Arnold Hunter*.

The Proprietors of the Locks and Canals on the Merrimack River Scholarship at Massachusetts Institute of Technology. Several years ago the Proprietors of the Locks and Canals on the Merrimack River, a corporation owning the power rights on the Merrimack River in Lowell, gave to the Massachusetts Institute of Technology a sum of money to provide graduate scholarships to graduates from the Lowell Textile Institute who held a degree and were recommended by the trustees. Applicants must have maintained throughout their undergraduate courses a high scholastic record and must meet the requirements of the Graduate School of the Massachusetts Institute of Technology. To *Irving Paul Wolf*.

Louis A. Olney Book Prizes.—Prizes in the form of books are awarded each year to the successful candidate on graduation day. The conditions in detail are as follows:—

\$10 to the student graduating from the Chemistry and Textile Coloring course, who, not having already received recognition by appointment as an assistant instructor, shall have maintained the highest scholarship through the course. To *Donald Henry Thomas*.

\$10 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship during his second year. To *Joseph Bernard Masaschi*.

\$5 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship during his second year. To *Ernest Malcolm Stromvall, Jr.*

\$10 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship in first-year Chemistry. To *Robert John Peirent*.

\$5 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship in first-year Chemistry. To *Joseph Hans Rosenbaum*.

STUDENT ACTIVITIES AND ORGANIZATIONS

School Publications.—The Text is issued bi-weekly and it contains news pertaining to activities in the Institute as well as information concerning alumni. The Pickout is an annual publication in charge of a manager and editor selected from the senior class. The board is composed of representatives from the various classes.

Societies.—There are four fraternities, three of which are national and one local, also one sorority. They afford opportunity for social life desired in a college career.

Dramatic Club.—The Dramatic Club gives a theatrical program annually. Appropriation is made from the profits to the treasury of the Athletic Association.

Professional Clubs.—The Textile Engineering Society is composed of all students registered in the Textile Engineering Course. The society holds meetings at which speakers are heard. The Student Chapter of the American Association of Textile Chemists and Colorists sponsors meetings addressed by speakers on technical subjects.

Rifle Club.—The rifle club offers opportunity to all students to attain proficiency in marksmanship and selects the team for interscholastic matches with other colleges.

Honor Society.—To degree candidates who have maintained a high scholarship for three years' work, or who have met with certain similar requirements, is accorded the honor of membership in the society Tau Epsilon Sigma. Relatively a membership in this society corresponds to that in some of the well-known honor societies of the liberal arts and scientific colleges. It requires constant attendance and application to the work of the course for any student to reach the scholarship level entitling him to this membership.

Honor Roll.—The President's List includes upper classmen taking a regular course who have a general average of eighty percent and no deficiencies.

Student Book Store.—A book store is operated on the cooperative plan by the Lowell Textile Associates, Inc., for the benefit and convenience of students who desire to purchase books, supplies, and other materials for use in connection with their work. It is conducted by a manager and two clerks, all of whom are undergraduates. The general business policy is under the control and supervision of a member of the Faculty. Any student may become an associate member of the Lowell Textile Associates, Inc., upon payment of the required fee and is thereby entitled to discount privileges when purchasing from the Book Store and from certain firms in the city of Lowell.

Alumni Association.—The Alumni Association of the Institute holds its annual meeting and banquet in May of each year.

The membership of the association is composed of graduates of the day courses and is open to any non-graduate who has attended the Institute for at least one year.

OFFICERS FOR THE YEAR 1942-43

Gilbert R. Merrill, '19, *President*

Charles H. Forsaith, '20, *Vice-President*

A. Edwin Wells, '20, *Secretary-Treasurer*

Communications should be addressed to A. Edwin Wells, Lowell Textile Institute.

EXECUTIVE COMMITTEE

Roy H. Bradford, '06

James F. Dewey, '04

Parker F. Dunlap, '34

John G. Echmalian, '16

Edwin D. Fowle, '24

Olin D. Gay, '08

Milton Hindle, '25

Thomas Joy, '26

Edward M. Lynch, '40

Francis P. Madden, '13

Richard W. Rawlinson, '31

Everett B. Rich, '11

Raymond R. Stevens, '19

J. Milton Washburn, Jr., '21

Herbert W. Wilkinson, Jr. '37

GRADUATES OF 1942

MASTER OF SCIENCE IN TEXTILE CHEMISTRY

WILLIAM GEORGE CHACE
Ph.B. Brown University
1926

JOHN HENRY SKINKLE
B.S. Massachusetts Institute of
Technology
1924

*WALTER WALLACE PLATT
B.T.C. Lowell Textile Institute 1941

*GEORGE SAMUEL URLAUB
B.T.C. Lowell Textile Institute 1941

BACHELOR OF TEXTILE CHEMISTRY

*GEORGE RAYMOND BOULE
PHILIP DANIEL CAINE
WILLIAM BURTON COFFIN
LEONARD ROBERT CORCORAN
*DAVID ORVILLE HAMER, JR.
CYRIL NEWCOMB HARPER
*ERNEST PETER JAMES
*ROBERT WALLACE MCCARTNEY
*GEORGE JOHN MANDIKOS
*ARTHUR JOSEPH MOREAU

JOHN ANTHONY MURPHY
*PAUL FRANCIS NOONAN
*VASIL JAMES PAPPAS
CAROLINE ELIZABETH PRATT
DUSTIN RAWLINSON
ZENON ANTHONY ROUMAS
STUART FREDERIC SHAFTER
STANLEY SZOPA
DONALD HENRY THOMAS
*IRVING PAUL WOLF

BACHELOR OF TEXTILE ENGINEERING

LEONARD HERMAN BAER
JOHN FREDRICK BROOK
DOUGLAS WHITNEY BULSON
ROBERT DANA CARMICHAEL
ALBERT DAVID EICHNER
THOMAS NATHAN FISHER
EDWARD GROSSMAN
*ROBERT ARNOLD HUNTER
JOSHUA DANIEL JAY

CHING SUT LAU
LELAND SUNG LIANG
*MORTON LEWIS OPPENHEIM
RUSSELL FREDERICK ROBERTS
DAVID ROGOFF
JEFFREY JAY SHAPIRO
*FRANCIS DUNHAM SMITH
*WALTER ALBERT STAKLINSKI
RALPH PEABODY WEBB

DIPLOMA IN COTTON MANUFACTURE

VERNON LEE WILKINSON

DIPLOMA IN WOOL MANUFACTURE

GEORGE HENRY BROOK
CARL WEBSTER HARRIS
DOUGLAS HAMILTON McELHINNEY

SAMUEL PEARSALL, II
WOODBURY HOLMES RAND
JOHN BAILEY ROBINSON

DIPLOMA IN TEXTILE DESIGN

EDITH KEIRSTEAD GARNETT

HERBERT PESETZKY

REGISTER OF DAY STUDENTS

GRADUATE STUDENTS

<i>Home Address</i>	<i>Lowell Address</i>
HARPER, CYRIL NEWCOMB, IV, Wakefield, Mass. B.T.C., Lowell Textile Institute, 1942	_____
GEORGE JOHN MANDIKOS, IV, Haverhill, Mass. B.T.C. Lowell Textile Institute, 1942	_____

UNDERGRADUATE STUDENTS

CANDIDATES FOR DEGREES

Class of 1943

ALLARD, ERNEST HERBERT, IV, Lowell, Mass.	78 Hanks Street
BASTERRECHEA, JUAN DE, IV, Habana, Cuba	9 Winter Street
BEUTER, RALPH JULIUS, VI, New York, N. Y.	Omicron Pi House
BRILLIANT, IRA FRANCIS, IV, Brooklyn, N. Y.	64 Mt. Hope Street
BULLOCK, RALPH LOUIS, IV, Lexington, Mass.	_____
COULMAN, MALCOLM PRESCOTT, IV, Saugus, Mass.	Omicron Pi House
DAVIS, ESTHER ALICE, IV, Lowell, Mass.	111 Stevens Street
DEMALLIE, PETER, IV, Lowell, Mass.	275 Gibson Street
FOISY, ROBERT WILLIAM, VI, Lowell, Mass.	55 Florence Road
FOSTER, CLARENCE EVERETT, VI, Lowell	43 Nesmith Street
FULLER, SAMUEL LLOYD, VI, Lowell, Mass.	R-2, Box 99
GARNETT, RICHARD HERBERT, VI, Edgewood, R. I.	Omicron Pi House
GILICK, THOMAS JOHN, JR., IV, Lowell, Mass.	47 South Walker Street
GOLDBERG, HERBERT ARTHUR, VI, Dorchester, Mass.	Alpha Epsilon House
GRIFFIN, ROGER CASTLE, JR., IV, Needham, Mass.	Omicron Pi House
HAGGERTY, WILLIAM THOMAS, IV, Lowell, Mass.	25 Robbins Street
HOCHSCHILD, REINHARD GEORGE, IV, Lowell, Mass.	123 Riverside Street
HOWARD, PHILIP JOHN, IV, North Andover	_____
JOHNSON, JOHN THOMAS, IV, Lowell, Mass.	35 Barasford Avenue
KELLY, ALLAN WILLIAM, VI, Lowell, Mass.	41 E Street
KENNEDY, MATTHEW ANTHONY, VI, Lowell, Mass.	19 Dracut Street
KITTAY, MORTON VICTOR, VI, New York, N. Y.	Alpha Epsilon House
KRINTZMAN, EDWARD, VI, Worcester, Mass.	Alpha Epsilon House
LISIEN, WALTER, IV, Lowell, Mass.	83 Whipple Street
McNELLIS, JAMES STANISLAUS, IV, Boston, Mass.	Phi Psi House
MALLON, JOHN FRANCIS, IV, Lawrence, Mass.	_____
MESSER, ALBERT SIDNEY, IV, Lowell, Mass.	236 Salem Street
O'LEARY, LOUISE MARGARET, IV, Dracut, Mass.	_____
PETERSEN, RICHARD EDWARD, IV, Concord, Mass.	_____
PINATEL, JOHN ANDRE, VI, Lowell, Mass.	Omicron Pi House
ROBERTS, DONALD CHESTER, VI, Chelmsford, Mass.	_____
ROWEN, EDWARD JOSEPH, JR., VI, West Roxbury, Mass.	_____
SCHLESINGER, MORTON, IV, New York, N. Y.	Phi Psi House
SIDEBOTTOM, WILLIAM JAMES, IV, Milton, Mass.	Alpha Epsilon House
SIEGEL, HAROLD, VI, Lowell, Mass.	Phi Psi House
SILBERSTEIN, RAYMOND, VI, Lowell, Mass.	142 Riverside Street
SILBERSTEIN, ROBERT HERBERT, VI, New York, N.Y.	71 Dover Street
SULLIVAN, PAUL HENRY, IV, Haverhill, Mass.	50 Standish Street
TAYLOR, WILLIAM WARREN, VI, Chelmsford, Mass.	_____
TEICHER, ARTHUR CHARLES, IV, Chicago, Ill.	_____
TYRIE, WALLACE ROLLEY, IV, Haverhill, Mass.	Alpha Epsilon House
VALENTE, LOUIS JOSEPH, VI, South Barre, Mass.	_____
ZENORINI, HENRY JOHN, VI, Teaneck, N. J.	87 Linden Street
	Phi Psi House

*Home Address**Lowell Address***Class of 1944**

ALPERIN, GEORGE, IV, Bradford, Mass.
 BERKOWITZ, JOSEPH HOWARD, VI, Yonkers, N. Y.
 CHAMBERS, EDWARD FRANCIS, VI, Webster, Mass.
 CHERENSON, ALAN HAROLD, VI, Lowell, Mass.
 CLOGSTON, SAMUEL LEIGHTON, VI, Lowell, Mass.
 COLBURN, JOHN ALLEN, IV, Dracut, Mass.
 DOO, VEE-BING, VI, Shanghai, China
 ECHAVARRIA, ALEXANDER MAURICIO, VI, Medellin,
 Colombia, S. A.
 FARREN, ROGER PATRICK, IV, Medford, Mass.
 FINE, THEODORE, VI, Haverhill, Mass.
 GOLDBERG, MELVIN DAVID, VI, Brookline, Mass.
 GOTTLIEB, EDWIN MEYER, IV, New York, N. Y.
 HALLETT, JOHN LAWRENCE, JR., VI, Lowell, Mass.
 HARRISON, MAURICE WILLIAM, VI, Lowell, Mass.
 HELFGOTT, STANLEY LEE, VI, Brightwaters, N. Y.
 HIRN, JOHN EDWARD, JR., IV, East Hartford, Conn.
 JAY, MILTON JERRY, VI, Brooklyn, N. Y.
 KAPLAN, KALMAN, VI, Everett, Mass.
 KENIN, PHILIP, IV, Brooklyn, N. Y.
 KLASHMAN, JULIAN BERNARD, VI, Cambridge, Mass.
 KOPYCINSKI, JOSEPH VALENTINE, IV, Lowell, Mass.
 KOSOWICZ, JULIEN FRANK, VI, Lowell, Mass.
 LAFRANCE, HENRY JOSEPH, IV, Tyngsboro, Mass.
 LANGLAIS, GEORGE OLIVER, IV, Lowell, Mass.
 LEITCH, JOHN BADGER, VI, Andover, Mass.
 LESHOWITZ, HAROLD, VI, Brooklyn, N. Y.
 MACLEAN, PHILIP EUGENE, IV, Swampscott, Mass.
 MCLEAN, JAMES ARTHUR, VI, Lowell, Mass.
 MARCUS, MARTIN BERNARD, VI, Brookline, Mass.
 MARINOPOULOS, CHARLES, VI, Lowell, Mass.
 MARTIN, PAUL JOSEPH, IV, Lowell, Mass.
 MASASCHI, JOSEPH BERNARD, IV, Jamaica Plain, Mass.
 NATH, VIRGINIA LOUISE, VI, Lowell, Mass.
 O'LOUGHLIN, HELEN MARY, VI, Lowell, Mass.
 PROCTOR, RICHARD, IV, Lowell, Mass.
 PULIAFICO, CARMELO ROSARIO, IV, Barre Plains, Mass.
 RABINOWITZ, IRVING MANNY, VI, Lowell, Mass.
 RICHARDSON, GEORGE FRANCIS, IV, Lowell, Mass.
 SASLOWSKY, SIDNEY, VI, Brooklyn, N. Y.
 SIMON, RICHARD BERNARD, IV, New York, N. Y.
 SMOLER, IRWIN CHARLES, VI, New York, N. Y.
 SPANOS, GEORGE PETER, IV, Lowell, Mass.
 STROMVALL, ERNEST MALCOLM, IV, Lowell, Mass.
 WALWOOD, JOHN THOMAS, IV, Lowell, Mass.
 WEINSTEIN, SAMUEL, IV, Brooklyn, N. Y.
 WOITKOSKI, STEPHEN ANTHONY, VI, Pittsfield, Mass.

Alpha Epsilon House
 Omicron Pi House
 71 Canton Street
 152 Wentworth Avenue
 1412 Bridge Street
 87 Mt. Washington Street

15 Douglas Road
 53 Mt. Hope Street
 137 Riverside Street
 272 Merrimack Street
 98 Wannalancit Street
 18 Bellevue Street
 11 White Street
 11 White Street
 5 White Street
 43 Plymouth Street
 272 Merrimack Street
 5 White Street
 242 Branch Street
 9 Raymond Place

48 Riverside Street
 236 Salem Street
 Omicron Pi House
 30 Greenfield Street
 Alpha Epsilon House
 234 Adams Street
 8 Fenwick Terrace
 Phi Psi House
 2020 Middlesex Street
 562 Westford Street
 187 Hovey Street
 59 Crescent Street
 5 White Street
 7 Fairmount Street
 142 Riverside Street
 Alpha Epsilon House
 Alpha Epsilon House
 14 West Bowers Street
 27 Hastings Street
 144 A Street
 Alpha Epsilon House
 37 Varney Street

Class of 1945

AXELROD, GERALD ALVAN, VI, Brighton, Mass.
 BANASH, LEONARD DAVID, IV, Brookline, Mass.
 BAUER, JEROME FREDERICK, IV, Waterloo, Ont.
 BAUM, BERNARD OSCAR, IV, Brookline, Mass.
 BERGER, STEFAN, IV, Lowell, Mass.
 BERKOWITZ, SIDNEY BERTRAM, VI, Boston, Mass.
 BLOOM, MELVIN ABRAHAM, VI, Everett, Mass.

5 White Street
 5 White Street
 Phi Psi House
 383 Walker Street
 21 Mt. Hope Street
 43 Plymouth Street

*Home Address**Lowell Address*

BOMBARA, FRANCIS JEROME, VI, East Douglas, Mass.	3 Pleasant Street
BOULE, WILFRED LEO, IV, Lowell, Mass.	66 Mt. Hope Street
CHWALEK, FRANK JOHN, IV, Lawrence, Mass.	_____
CLEARY, LAWRENCE TWOMEY, IV, Andover, Mass.	_____
DEMALLIE, STEPHEN POTTER, VI, Lowell, Mass.	275 Gibson Street
FRANK, ALLEN MORRIS, IV, Lowell, Mass.	430 Wilder Street
GILMAN, THEODORE HERBERT, VI, Brookline, Mass.	137 Riverside Street
GODET, JOHN RUSSELL, IV, Lowell, Mass.	71 Agawam Street
GRAHAM, WILLIAM FRANCIS, JR., VI, Haverhill, Mass.	_____
GREGG, JULIAN BARNES, VI, Worcester, Mass.	Phi Psi House
HOYLE, ALBERT GERARD, IV, Lowell, Mass.	128 Mt. Hope Street
HUNSTEIN, ARTHUR WALTER, VI, New York, N. Y.	43 Plymouth Street
KING, JAMES ROBERT, VI, Lowell, Mass.	158 Howard Street
KIRSCHMAN, SAMUEL HARDING, VI, Brooklyn, N. Y.	Alpha Epsilon House
LANDRY, CHARLES JOSEPH, VI, Lowell, Mass.	348 Hildreth Street
LANGER, MORTON FREDERICK, VI, New York, N. Y.	Alpha Epsilon House
LASAR, LIONEL, VI, Lowell, Mass.	123 Riverside Street
LINT, THEODORE MICHAEL, JR., VI, Neponsit, L. I., N. Y.	_____
MACDOUGALL, EARL ALLEN, VI, Waltham, Mass.	43 Plymouth Street
McKNIFF, JOHN THOMAS, IV, Forge Village, Mass.	_____
McKONE, PETER JOSEPH, IV, Lowell, Mass.	29 Orleans Street
McNALLY, ALAN MARTIN, IV, Lowell, Mass.	55 South Whipple Street
MEISTER, ROBERT BENJAMIN, IV, Maynard, Mass.	_____
MEYER, JOHN HARRY, VI, Norwich, Conn.	137 Riverside Street
MILGRIM, SIDNEY, IV, Brooklyn, N. Y.	5 White Street
MIRANOWICZ, JOSEPH JOHN, IV, Lawrence, Mass.	_____
MOSS, WARREN DONALD, VI, New York, N. Y.	21 Mt. Hope Street
O'DONNELL, JAMES FRANCIS, IV, North Chelmsford, Mass.	_____
O'FLAHAVAN, JAMES MICHAEL, IV, Lowell, Mass.	62 Colonial Avenue
PEIRENT, ROBERT JOHN, IV, Dracut, Mass.	_____
PENNER, STUART EMANUAL, IV, Lawrence, Mass.	5 White Street
PERLMAN, SUMNER EARL, VI, Lawrence, Mass.	_____
ROSENBAUM, JOSEPH HANS, IV, Lowell, Mass.	617 Westford Street
ROUGHAN, JOHN MICHAEL, IV, Lowell, Mass.	30 Fort Hill Avenue
SAYERS, THOMAS MARTIN, VI, Lowell, Mass.	27 Burt Street
SCANNELL, JOHN PATRICK, VI, Lowell, Mass.	151 Princeton Street
SCHWARTZ, JOSEPH MICHAEL, VI, Manhattan Beach, N. Y.	_____
SIEGEL, MELVIN, VI, New York, N. Y.	19 Mt. Hope Street
SPICER, GEORGE WILLIAM, IV, Lowell, Mass.	19 Mt. Hope Street
STROUP, JOHN FRANCIS, JR., IV, Dorchester, Mass.	19 Rhodora Street
SULLIVAN, JOHN EDWARD, VI, Lowell, Mass.	_____
SWEENEY, JAMES WILLIAM, VI, Lowell, Mass.	280 Beacon Street
VARON, JOSE ESKENAZI, IV, Lima, Peru	23 St. James Street
VIAU, GEORGE ORLANDO, VI, Lowell, Mass.	9 White Street
WERKOWSKI, STANLEY JOSEPH, VI, Lowell, Mass.	12 Whitney Avenue
WILBUR, EARL RAYMOND, IV, Lowell, Mass.	39 Apple Street
	172 Shaw Street

Class of 1946

ADAMOPOULOS, LEWIS, IV, Haverhill, Mass.	_____
ALDEN, JOHN, VI, Lowell, Mass.	56 Holyrood Avenue
ALLEN, ERNEST HAROLD, IV, Ayer, Mass.	_____
ALLY, ROGER EDWARD, VI, Lowell, Mass.	40 Fanning Street
AXELROD, ALAN STANLEY, IV, Newton, Mass.	28 Riverside Street
BAILES, SEYMOUR SIDNEY, VI, Brooklyn, N. Y.	51 Bellevue Street
BAILEY, HENRY REGINALD, JR., VI, Lowell, Mass.	19 Holden Street

Home Address

BARROWS, FREDERICK WILLIAM, IV, Lowell, Mass.
 BEITLER, SAMUEL, VI, Lawrence, Mass.
 CALDERWOOD, CHARLES EMERY, IV, Andover, Mass.
 CARBONE, THEODORE AUGUST, IV, Haverhill, Mass.
 CHADWICK, THOMAS NIELSEN, VI, Lowell, Mass.
 CHERTAVIAN, LEVON, IV, Lowell, Mass.
 CLARK, SPENCER JOSEPH, JR., IV, Winsted, Conn.
 CLEWLEY, WILLIAM BALLARD, IV, Woburn, Mass.
 DALEY, JAMES THOMAS, VI, Pawtucket, R. I.
 DERBY, JAMES HENRY, VI, Lawrence, Mass.
 DOWNING, PARKER WILLARD, IV, Ayer, Mass.
 DUFFY, JOSEPH GORDON, VI, Methuen, Mass.
 EADIE, CHARLES JAMES, IV, Dracut, Mass.
 FISHMAN, MAURICE, IV, Roxbury, Mass.
 FLANAGAN, WILLIAM JOSEPH, VI, Lowell, Mass.
 FOLEY, ELEANOR ELIZABETH, IV, Lowell, Mass.
 ROX, RICHARD COLEMAN, VI, Lowell, Mass.
 FRANKLIN, AMY ADELE, VI, Lowell, Mass.
 GLASHEEN, RICHARD WELCH, IV, Lowell, Mass.
 GOTTLIEB, SEYMOUR, VI, Brooklyn, N. Y.
 GREENMAN, GERALD MORTON, IV, Brooklyn, N. Y.
 GRUBER, PHILLIP ARTHUR, IV, Lowell, Mass.
 GUNTHER, GEORGE HERBERT, IV, Lowell, Mass.
 HARRIS, EARL FELTON, VI, Orange, Mass.
 INFELD, ERIK, VI, New York, N. Y.
 JACK, CHARLES CUTTER, VI, Pelham, N. H.
 JACKSON, JEROME EDWARD, VI, Methuen, Mass.
 KATZ, HERBERT JOSEPH, IV, Brooklyn, N. Y.
 KEARNS, ROBERT WILLIAM, VI, Fonda, N. Y.
 KELLY, JOHN RICHARD, VI, Lowell, Mass.
 KING, JOHN MICHAEL, JR., VI, Lowell, Mass.
 KOCZERA, EDWIN JOSEPH, IV, Lowell, Mass.
 LANDRY, RITA PEARL, IV, Lowell, Mass.
 LAPIDUS, CHARLES HENRY, Brooklyn, N. Y.
 LEE, RICHARD WALLACE, IV, Chelmsford, Mass.
 LEONARD, JAMES HAYDEN, VI, North Pembroke, Mass.
 LERMAN, ALEX, VI, New York, N. Y.
 LESSER, STANLEY BAKER, VI, Brooklyn, N. Y.
 MCCANN, JAMES FRANCIS, VI, Lowell, Mass.
 MCCARTIN, JOHN PETER, VI, Lowell, Mass.
 McDONOUGH, JOSEPH MICHAEL, VI, Lowell, Mass.
 McENEANEY, MARY ELIZABETH, IV, Lawrence, Mass.
 MACUGA, FRANCIS ROBERT, VI, East Douglas, Mass.
 MARDER, SOLOMON, VI, Rock Island, Ill.
 MARKERT, DAVID LE ROY, VI, Andover, Mass.
 MARZBANIAN, VAHE DAVID, IV, Lowell, Mass.
 MEISTER, KENNETH HAROLD, IV, Maynard, Mass.
 PARTHUM, RICHARD IRVING, IV, Lawrence, Mass.
 PIRO, JOHN, IV, Providence, R. I.
 QUINNEY, PAUL REED, IV, Lowell, Mass.
 RICHARDSON, DONALD FORREST, VI, Lowell, Mass.
 RUDOLF, MITCHELL JOSEPH, VI, Lowell, Mass.
 SAYERS, ROBERT EDWARD, VI, Lowell, Mass.
 SCHNEIDER, FRED, VI, New York, N. Y.
 SCRIBNER, MARY LOUISE, IV, Tewksbury, Mass.
 SEGAL, HERBERT HENRY, IV, Brookline, Mass.
 SHAPIRO, SUMNER, VI, Lowell, Mass.
 SHARCOFF, RITA, IV, Lowell, Mass.

Lowell Address

3 Fairfield Street
 9 White Street

 57 Robbins Street
 135 Beacon Street
 137 Riverside Street

 Phi Psi House

 33 Gertrude Avenue
 120 Fulton Street
 27 Royal Street
 17 Columbia Street
 656 Wilder Street
 Alpha Epsilon House
 Alpha Epsilon House
 57 Corbett Street
 94 Merrill Avenue
 359 Beacon Street
 43 Plymouth Street

 Alpha Epsilon House
 Phi Psi House
 53 South Walker Street
 91 Gorham Street
 92 Third Street
 348 Hildreth Street
 Alpha Epsilon House

 226 Riverside Street
 59 Bellevue Street
 51 Bellevue Street
 27 Sidney Street
 437 East Merrimack Street
 14 Highland Street

 Phi Psi House
 53 Mt. Hope Street

 80 Third Street

 25 Vine Street, Lawrence
 13 Myrtle Street
 557 Beacon Street
 5 Hazel Square
 27 Burt Street
 43 Plymouth Street

 Alpha Epsilon House
 37 Canton Street
 129 Westford Street

Home Address

SHAUGHNESSY, JOHN ANDREW, VI, Lowell, Mass.
 SIDEMAN, ALLEN LEONARD, VI, Lowell, Mass.
 SULLIVAN, WILLIAM CORNELIUS, IV, Lawrence, Mass.
 TERES, HOWARD FRED, VI, New York, N. Y.
 TERRET, PHYLLIS DUNCAN, IV, North Andover, Mass.
 WALKER, ANTHONY FRANCIS, VI, Haverhill, Mass.

Lowell Address

18 Puffer Street
 59 Bellevue Street

 137 Riverside Street

DIPLOMA STUDENTS

Class of 1943

FIELDSEND, ARTHUR TULL, II, Hudson, Mass.	Omicron Pi House
MACDONALD, BARBARA TURNER, III, Lowell, Mass.	92 Stevens Street
WALL, JAMES THOMAS, II, Lowell, Mass.	157 Pleasant Street
WEBER, ALFRED JULIUS, II, Clifton, N. J.	Omicron Pi House

Class of 1944

GARCIA, JULIO, II, Santiago, Chile	15 Douglas Road
GUIMARAES, PAULO MOURAO, I, Rio de Janeiro, Brazil	53 Mt. Hope Street
LARIVIERE, STEPHEN GERARD, III, Southbridge, Mass.	28 Riverside Street

Class of 1945

BORGES, MILTON VELLOZO, I, New York, N. Y.	831 Merrimack Street
NALBANDIAN, ARCHAVIR MELKONIAN, Santiago, Chile	50 Standish Street
RICKETTS, JOSE GUILLERMO, II, Arequipa, Peru	15 Douglas Road
URIARTE, IGNACIO, I, Santiago, Chile	Phi Psi House

Specials

BELL, WALTER GEORGE, VI, Burlington, Ont.	Omicron Pi House
BONTE, ANDRE ROGER, VI, Woonsocket, R. I.	Phi Psi House
CHEVALIER, EMILE ROMEO, III, Lowell, Mass.	66 West Street
HUBERT, LEO REMY, III, Lowell, Mass.	113 School Street
KORJENEWSKI, JOHN, III, North Adams, Mass.	630 Merrimack Street
LODGE, JACK DEARNLEY, III, Danielson, Conn.	Coles Inn
RUDNICK, MAXWELL, I, New Haven, Conn.	5 White Street
PEASE, HERBERT LEROY, II, Ludlow, Vt.	50 Standish Street
WALSH, EDWARD FRANCIS, III, Lowell, Mass.	37 Bartlett Street
WILKINSON, VERNON LEE, IV, Southbridge, Mass.	Omicron Pi House
ZAPENAS, STANLEY LEO, III, Lawrence, Mass.	_____

ALPHABETICAL LIST OF GRADUATES

Master of Science degree was first given in 1936. Other degrees were issued beginning with the year 1913 as follows: B.T.C.—Bachelor of Textile Chemistry; B.T.D.—Bachelor of Textile Dyeing; B.T.E.—Bachelor of Textile Engineering. A diploma is indicated by D and a certificate (covering a partial course only) by C.

The following list has been corrected in accordance with information received previous to February 1, 1943. Any information regarding incorrect or missing addresses is earnestly solicited.

A

- Abbot, Edward Moseley, II, '04 (D).**
President and General Manager, Abbot Worsted Co., Graniteville, Mass.
- Abbott, George Richard, II, '08 (D).**
Tree Warden, Andover, Mass.
- Acar, Ibrahim Zeki, VI, '38 (M.S.).**
General Textile Engineer, Malatya Textile Mills, Malatya, Turkey.
- Adams, Floyd Willington, VI, '16 (B.T.E.).**
- Adams, Henry Shaw, I, '05 (D).**
Assistant Treasurer, The Springs Cotton Mills, Lancaster, S. C.
- Adams, Tracy Addison, IV, '11 (D).**
Superintendent, Lawrence Print Works, Lawrence, Mass.
- Adie, Donald Miles, VI, '41 (B.T.E.).**
Ensign, U. S. Naval Reserve.
- Aigen, Lawrence, VI, '40 (B.T.E.).**
Inspector of Textiles, U. S. Army Quartermaster Depot, Philadelphia, Pa.
- Albrecht, Charles Henry, IV, '17 (B.T.C.).**
Chief Chemist, Atlantic Mills, Providence, R. I.
- Alexander, Gerard, VI, '41 (B.T.E.).**
Officers Training School, U. S. Marine Corps, Quantico, Va.
- Allard, Edward Joseph, IV, '31 (B.T.C.).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corp., Providence, R. I.
- Allen, Grover Stanley, IV, '34 (B.T.C.).**
U. S. Army
- Almquist, George John Edwin, I, '19 (D).**
Second Vice-President, Passaic-Bergen Lumber Company, Passaic, N. J.
- Anderson, Arthur Iilman, IV, '24 (B.T.C.).**
Textile Chemist, Superintendent of Research, American Institute of Laundering, Joliet, Ill.
- Anderson, Arthur Julius, IV, '19 (B.T.C.).**
Technical Salesman, National Aniline Division, Allied Chemical & Dye Corp., 40 Rector St., New York, N. Y.
- Anderson, Clarence Alfred, VI, '25 (B.T.E.).**
Cost Department, Hathaway Mfg. Company, New Bedford, Mass.
- Anderson, Harold Robert, II, '26 (D).**
With Abbot Worsted Company, Forge Village, Mass.
- Annan, David, II, '23 (D).**
- Anthony, Henry Steere, Jr., IV, '36 (B.T.C.).**
Lieutenant, Chemical Warfare Service, U. S. Army.
- Appel, Mrs. Bessie L. (Lifland, Bessie) IV, '32 (B.T.C.).**
Assistant Chemist, Massachusetts Knitting Mill, Jamaica Plain, Mass.
- Arienti, Peter Joseph, IV, '10 (D).**
Chief Chemist and Superintendent of Dyeing, Sayles Finishing Plants, Inc., Saylesville, R. I.
- Arundale, Henry Barnes, II, '07 (D).**
177 Beacon Street, Boston, Mass.
- Atwood, Henry Jones, II, '23 (D).**
Agent, Amos Abbott Company, Dexter, Me.

B

- Babb, Charles Wilkes, Jr., II, '31 (D).**
With Knox Woolen Company, Camden, Me.
- Babing, Edward, IV, '33 (B.T.C.).**
With Outlet Fruit Company, Lowell, Mass.

- Babigan, Raymond, IV, '24 (B.T.C.).**
Examiner, U. S. Patent Office, Washington, D. C.
- Bachelder, Charles Edward, IV, '24 (B.T.C.).**
Superintendent of Acetate Yarn Division, Tennessee Eastman Corporation, Kingsport, Tenn.
- Baer, Leonard Herman, VI, '42 (B.T.E.).**
Aviation Cadet, U. S. Army.
- Bagshaw, Herbert Arthur Edward, VI, '32 (B.T.E.).**
Time Study Department, Worsted Division, Pacific Mills, Lawrence, Mass.
- Bailey, Lester Harold, IV, '24 (B.T.C.).**
Captain, Chemical Warfare Service, Edgewood Arsenal, Md.
- Bailey, Walter James, IV, '11 (D).**
Bailey's Cleansers and Dyers, Watertown, Mass.
- Baker, Franz Evron, VI, '26 (B.T.E.).**
Mill Superintendent, Hampshire Woolen Co., Ware, Mass.
- Baker, Maurice Sidney, IV, '25 (B.T.C.).**
Merchant, Baker's Dress Goods Shop, Norwood, Mass.
- Baker, Phyllis Jeanne, VI, '39 (B.T.E.).**
Textile Analyst, Laboratory Division, Warwick Mills, Boston, Mass.
- Baker, William John, IV, '16 (D).**
Manufacturing Superintendent, E. I. du Pont de Nemours & Co., Buffalo, N. Y.
- Balch, Ralph Herman, VI, '29 (B.T.E.).**
Development Engineer, Celanese Corporation of America, Amelle, Md.
- Baldwin, Frederick Albert, II, '04 (D).**
President, Federal Clothing Manufacturing Company, Ltd., Sherbrooke, Que.
- Banta, John Garrett, VI, '39 (B.T.E.).**
Lieutenant, U. S. Naval Air Corps.
- Bard, Morry Arnold, IV, '30 (B.T.C.).**
President and Textile Chemist, Silver Line Dye Works, Inc., New York City.
- Barzdik, Thaddeus, IV, '41 (B.T.C.).**
Junior Chemist P-1, U. S. Army Quartermaster Depot, Philadelphia, Pa.
- Barlofsky, Archie, VI, '17 (B.T.E.).**
Attorney at law, Barlofsky & Barlofsky, Lowell, Mass.
- Barr, I. Walwin, I, '00 (D).**
Secretary, Buckley Brothers Company, Inc., 881 Broadway, New York City.
- Barrett, Andrew Edward, IV, '23 (B.T.C.).**
Field Engineer, Armour & Co., North Bergen, N. J.
- Barry, Leo Joseph, II, '27 (D).**
With Bell Company, Worcester, Mass.
- Barry, Marie Gertrude, IV, '32 (B.T.C.).**
Colorist, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Basdikis, Charles Apostolos, IV, '36 (B.T.C.).**
Electrical Designer, Stone & Webster Engineering Corporation, Boston, Mass.
- Bassett, Louis Loss, VI, '37 (B.T.E.).**
Manufacturer Glenbar Fabrics, Lowell, Mass.
- Batcheller, Ben Pitman, VI, '41 (B.T.E.).**
Aviation Cadet, Maxwell Field, Montgomery, Ala.
- Bates, Wesley Elliott, VI, '36 (B.T.E.).**
2514 Blakemore Ave., Nashville, Tenn.
- Bauer, Frank Norbert, I, '39 (D).**
Superintendent, Bauer's Ltd., Waterloo, Ont.
- Bauer, Harold Conrad, III, '28 (D).**
With Henry Bauer, Textile Novelties, Lawrence, Mass.

- Beattie, John Silas, IV, '35 (B.T.C.).**
Chemist, American Viscose Corporation, Marcus Hook, Pa.
- Beauregard, Albert Joseph, VI, '39 (B.T.E.).**
Engineer Draftsman, Grumman Aircraft Engineering Corp., Bethpage, L. I.
- Beck, Frederic Christian, II, '24 (D).**
In business. Weld & Beck, Southbridge, Mass.
- Beeman, Earl Royal, VI, '30 (B.T.E.).**
Superintendent, Kendall Mills, Colrain, Mass.
- Belgelder, Edgar Raymond, IV, '34 (B.T.C.).**
Colorist, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Bell, Edward Benjamin, IV, '24 (B.T.C.).**
Chemist, Calgon, Inc., Lowell, Mass.
- Beltrami, Kenneth Charles, VI, '40 (B.T.E.).**
With Deering-Milliken Co., New York, N. Y.
- Bennett, E. Howard, II, '03 (C).**
Publisher, American Wool and Cotton Reporter, 530 Atlantic Avenue, Boston, Mass.
- Bentley, Byron, II, '26 (D).**
Superintendent and General Manager, Joseph Bentley Hair Company, Methuen, Mass.
- Bergeron, Alvin Wilfred, IV, '29 (B.T.C.).**
Chemist, Celanese Corporation of America, Amelle, Md.
- Berry, Wilbur French, II, '17 (D).**
Superintendent, Thomas Kay Woolen Mill, Salem, Oreg.
- Bertrand, Arthur Leon, IV, '32 (B.T.C.).**
- Bethel, Ion Maywood, VI, '39 (M.S.) (B.S.).**
Texas Agricultural and Mechanical College, 1925).
Major, U. S. Marine Corps, Officer in Charge of Inspection, Philadelphia, Pa.
- Bienstock, George Jerrard, III, '24 (D).**
Stylist, Designer, Yorkshire Worsted Mills, New York City.
- Billings, Borden Dickinson, I, '29 (D).**
- Bird, Clarence Henry, II, '22 (D).**
Assistant Superintendent, Schuster Woolen Company, Inc., East Douglas, Mass.
- Bird, Francis John, VI, '22 (B.T.E.).**
Attorney-at-Law, 227 Bronson Building, Attleboro, Mass.
- Birtwell, John Lincoln, IV, '34 (B.T.C.).**
Cadet, Technical School, Air Corps, Chanute Field, Ill.
- Blaikie, Howard Mills, II, '11 (D).**
- Blake, Parker Gould, VI, '14 (D).**
Salesman, G. Whitaker & Co., Ltd., Peterborough, Ont.
- Blanchard, Armand Eugene, III, '41 (D).**
Soldier, U. S. Army.
- Blanchard, John Lawrence, II, '23 (D).**
- Bogdan, John Francis, VI, '35 (B.T.E.).**
With Manville Jenckes Corporation, Manville, R. I.
- Bone, Arthur Peter Stuart, VI, '39 (B.T.E.).**
Sales, Arthur Bone, Inc., Los Angeles, Calif.
- Booth, James Mooney, IV, '24 (B.T.C.).**
Technical Sales, The Huron Milling Company, 9 Park Place, New York City.
- Bordett, Sidney Morris, VI, '37 (B.T.E.).**
Salesman, L. W. Guild Co., Boston, Mass.
- Bottomley, John, III, '28 (D).**
Assistant Technician, Joshua L. Bailey & Co., 40 Worth Street, New York City.
- Boule, George Raymond, IV, '42 (B.T.C.).**
Midshipman, U. S. Navy.
- Boyd, William, Jr., IV, '40 (B.T.C.).**
Salesman, Ciba Co., Inc., 325 West Huron Street, Chicago, Ill.
- Boynton, Bradford Lewis, II, '35 (D).**
Volunteer Officer Candidate, U. S. Army.
- Bradford, Edward Hosmer, VI, '35 (B.T.E.).**
Assistant Overseer of Carding, Manville-Jenckes Corporation, Manville, R. I.
- Bradford, Harold Palmer, II, '25 (D).**
- Bradford, Roy Hosmer, II, '06 (D).**
Appraiser, Textile Machinery, Reconstruction Finance Corporation, 161 Devonshire Street, Boston, Mass.
- Bradford, William Swanton, VI, '31 (B.T.E.).**
General Foreman, E. W. Twitchell, Inc., Philadelphia, Pa.
- Bradley, Raymond Frost, VI, '14 (D).**
Garage Proprietor, Twin Light Garage, 267 East Main Street, Gloucester, Mass.
- Bradley, Richard Henry, V, '01 (C).**
Gasoline Salesman, Fairhaven, Mass.
- Brainerd, Arthur Travena, IV, '09 (D).**
Manager, Ciba Company, Inc., 325 West Huron Street, Chicago, Ill.
- Brainerd, Carl Emil, IV, '20 (B.T.C.).**
Dyer, F. C. Huyck & Sons, Albany, N. Y.
- Brandt, Carl Dewey, VI, '20 (B.T.E.).**
Research Engineer, Whitin Machine Works, Whitinsville, Mass.
- Brannen, Leon Vincent, III, '07 (C).**
- Brantman, Jackson Agmor, VI, '39 (B.T.E.).**
1326 Service Unit, Q. M. D. No. 1, Camp Lee, Va.
- Brickett, Raymond Calvin, II, '14 (D).**
Overseer, M. T. Stevens & Sons Company (Marland Mills), Andover, Mass.
- Bridges, Herbert Gardner, II, '34 (D).**
Manager and Representative, The New Hampshire Company, Portsmouth, N. H.
- Brigham, Howard Mason, VI, '24 (B.T.E.).**
Sales and Manufacturing Executive, Wellington, Sears Co., 65 Worth Street, New York City.
- Broadhurst, Russell Denton, IV, '38 (B.T.C.).**
2 Laurel Street, Middletown, Conn.
- Bronson, Howard Seymour, II, '27 (D).**
Overseer of Knitting, Portage Hosiery Company, Portage, Wis.
- Brook, George Henry, II, '42 (D).**
Norfolk Street, South, Simcoe, Ont.
- Brook, John Frederick, VI, '42 (B.T.E.).**
Second Lieutenant, Canadian Army.
- Brooks, Raymond King, Jr., VI, '41 (B.T.E.).**
- Brosnan, William Francis, IV, '27 (B.T.C.).**
Superintendent, F. P. Maupai Dyeing Co. Inc., West New York, N. J.
- Brown, Gerald Marston, VI, '22 (B.T.E.).**
- Brown, Needham Ballou, Jr., VI, '41 (B.T.E.).**
Textile Engineer, Celanese Corporation of America, Cumberland, Md.
- Brown, Philip Franklin, II, '23 (D).**
Assistant Sales Director, E. I. du Pont de Nemours, Rayon Division, Wilmington, Del.
- Brown, Rollins Goldthwaite, IV, '12 (D).**
Representative, Investors Syndicate, Chamber of Commerce Building, Boston, Mass.
- Brown, Russell Lee, VI, '21 (B.T.E.). '40 (M.S.).**
Professor of Textiles; in charge Department of Woolen Yarns, Lowell Textile Institute, Lowell, Mass.
- Brown, Will George, Jr., IV, '22 (B.T.C.).**
Sales Engineer, Wallerstein Company, 180 Madison Avenue, New York City.
- Buchan, Donald Cameron, II, '01 (D).**
Assistant Superintendent, M. T. Stevens & Sons Company, North Andover, Mass.
- Buchan, Norman Spaulding, IV, '26 (B.T.C.).**
Textile Chemist, Newmarket Manufacturing Company, Lowell, Mass.
- Buck, Roy Garvin, Lieutenant (S.C.) U.S.N., VI, '41 (M.S.). (B.S., 1933, U. S. Naval Academy.)**
Textile & Clothing Inspection Officer, Naval Clothing Depot, Brooklyn, N. Y.
- Buckley, Herman Timothy, IV, '39 (B.T.C.).**
Assistant Chemist, J. L. Stifel & Sons, Wheeling, W. Va.
- Bukala, Mitchell John, IV, '34 (B.T.C.).**
Chemist, Massachusetts Mohair Plush Company, Lowell, Mass.
- Bullock, Merlen Clarke, VI, '40 (B.T.E.).**
Assistant Materials Engineer (Textiles), Naval Aircraft Factory, U. S. Navy Yard, Philadelphia, Pa.
- Bulson, Douglas Whitney, VI, '42 (B.T.E.).**
Engineer, Mechanical Department, U. S. Rubber Co., Naugatuck, Conn.
- Burbeck, Dorothy Maria, IV, '20 (B.T.C.).**
See Garlick, Mrs. Dorothy M.
- Burger, Samuel Joseph, III, '24 (D).**
Textile Consultant, 50 East 42nd St., New York, N. Y.
- Burke, James Edward, Jr., IV, '34 (B.T.C.).**
Police Officer, Lowell Police Department Lowell, Mass.
- Burnham, Frank Erwin, IV, '02 (D).**
Chemist and Dyer, Henry Klous, Inc., Lawrence, Mass.
- Burns, Robert, IV, '28 (B.T.C.).**
- Burt, Joseph Frederic, VI, '31 (B.T.E.).**
Assistant to Superintendent, Abbot Worsted Company, Forge Village, Mass.

Buzzell, Harry Saville, VI, '29 (B.T.E.).
Supervisor, Oxford Paper Company, Rumford, Maine.

C

Caine, Philip Daniel, IV, '42 (B.T.C.).
Ensign, U. S. Naval Reserve

Calder, Marian Brownson, VI, '37 (M.S.). See Sigel, Mrs. A. E.

Callahan, John Joseph, Jr., II, '26 (D).
Color Chemist, Technicolor Motion Picture Corporation, Boston, Mass.

Cameron, Elliott Francis, IV, '11 (D).
Attorney-at-law, Willard, Allen and Mulkern, 100 Milk Street, Boston, Mass.

Campbell, Alexander, VI, '23 (B.T.E.).
Plant Engineer, Arlington Mills, Lawrence, Mass.

Campbell, Allan, Jr., VI, '32 (B.T.E.).
Contractor, A. & A. Campbell Co., South Boston, Mass.

Campbell, Andrew Morris, IV, '40 (B.T.C.).
Chemist, Pacific Mills, Lawrence, Mass.

Campbell, Louise Porter, IIIB, '03 (C).
With Ginn & Co., Stadler Bldg., Boston, Mass.

Campbell, Orison Sargent, II, '03 (D).
President and Manager, Industrial Felts, Ltd., Kitchener, Ont.

Cannell, Philip Stuart, VI, '23 (B.T.E.).
Hotel Proprietor, Carlton Hotel, Malden, Mass.

Carbone, Alfred John, IV, '31 (B.T.C.).
Chemist and Colorist, Sandoz Chemical Works, Philadelphia, Pa.

Carleton, Joseph Raddin, III, '30 (D).
Manager, Defense Division, Bridgeport Fabrics, Inc., Bridgeport, Conn.

Carmichael, Robert Dana, VI, '42 (B.T.E.).
Engineering Draftsman, U. S. Rubber Co., Naugatuck, Conn.

Carr, George Everett, I, '05 (D).
343 5th Street, Ridgfield Park, N. J.

Carr, Paul Edward, II, '24 (D).
Assistant General Manager, L. C. Chase & Co., Inc., 295 Fifth Avenue, New York City.

Carter, Russell Albert, II, '25 (D).
Textile Engineer, Hampton Company, Easthampton, Mass.

Cary, Julian Clinton, VI, '10 (D).
Connecticut Manager, The American Mutual Liability Insurance Company, 15 Lewis Street, Hartford, Conn.

Casey, Francis Harold, IV, '31 (B.T.C.).
Salesman and Demonstrator, Sandoz Chemical Works, Inc., Boston, Mass.

Caya, Ferdinand Joseph, IV, '22 (B.T.C.).
Superintendent, Falls Yarn Mills, Woonsocket, R. I.

Chace, William George, Ph.B., IV, '42 (M.S.).
(Ph.B., Brown University, 1926).
Instructor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.

Chamberlin, Frederick Ellery, I, '03 (D).
Overseer of Spinning, Monument Mills, Housatonic, Mass.

Chandler, Proctor, IV, '11 (D).
With Packard Mills of Webster, at Caryville, Mass.

Chang, Chi, VI, '23 (B.T.E.).

Chang, Wen Chuan, VI, '21 (B.T.E.).

Chapman, Mrs. Boyd P., Jr. (O'Donoghue, Eileen Margaret) VI, '39 (B.T.E.).
153 Emmons Street, Franklin, Mass.

Chapman, Leland Hildreth, VI, '24 (B.T.E.).
Director of Guidance, School Department, Hingham, Mass.

Chen, Shih Ching, IV, '22 (B.T.C.).

Chen, Wen-Pei, IV, '24 (B.T.C.).

Church, Charles Royal, II, '06 (C).
Teacher, San Diego High School, San Diego, Calif.

Churchill, Charles Whittier, III, '06 (D).
Manager, Churchill Manufacturing Company, Inc., Lowell, Mass.

Clark, Earl William, IV, '18 (B.T.C.).
Research Chemist, National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.

Clark, Thomas Talbot, II, '10 (D).
President and Treasurer, Talbot Mills, North Billerica, Mass.

Clarke, George Dean, II, '21 (C).
410 South Ardmore Avenue, Los Angeles, Calif.

Clayton, Harold Edmund, VI, '21 (B.T.E.).
Treasurer and Manager, Clayton Hosiery Mills, Inc., Lowell, Mass.

Cleary, Charles Joseph, II, '13 (D).
Principal Materials Engineer, United States Army Air Corps, Dayton, Ohio.

Clement, David Scott, IV, '24 (B.T.C.).
Overseer of Dyeing, Nashua Manufacturing Company, Nashua, N. H.

Cleveland, Richard Sumner, VI, '30 (B.T.E.).
1st Lt., Office Quartermaster General, U. S. Army, Washington, D. C.

Clifford, Albert Chester, VI, '22 (B.T.E.).
Textile Engineer, Western Electric Company, Inc., Kearny, N. J.

Clogston, Raymond B., IV, '04 (D).
Superintendent of Dyeing, Merrimack Manufacturing Company, Lowell, Mass.

Cluett, John Girvin, I, '29 (D).
Assistant Superintendent of Shirt Laundry, Cluett, Peabody & Co., Inc., Troy, N. Y.

Coan, Charles Bisbee, IV, '12 (D).
Salesman and Demonstrator, American Aniline Products Company, Boston, Mass.

Cobb, Joseph Calvin, VI, '36 (B.T.E.).
Office Manager and Representative, Middlesex Paper Tube Company of New Jersey, Trenton, N. J.

Cobin, Arthur Edward, IV, '23 (B.T.C.).
With National Hosiery Dyeing and Finishing Works, Boston, Mass.

Coffey, Daniel Joseph, III, '28 (D).
Blanket Inspector, F. C. Huyek & Sons, Rensselaer, N. Y.

Coffin, William Burton, IV, '42 (B.T.C.).
With National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.

Cohen, Leonard Lee, II, '39 (D).
Designer, S. Stroock & Co., Newburgh, N. Y.

Cohen, Raphael Edvab, IV, '25 (B.T.C.).
Sales Manager, Merrimack Paper Tube Company, Inc., Lowell, Mass.

Colby, J. Tracy, VI, '16 (D).
Sales Manager, F. C. Huyek & Sons, New York City.

Colby, Vernon Warren, IV, '40 (B.T.C.).
Assistant Dyer, J. L. Stifel & Sons, Inc., Wheeling, W. Va.

Colby, Willard Alvah, Jr., IV, '30 (B.T.C.).
With Hanes Dye & Finishing Co., Winston-Salem, N. C.

Cole, Edward Earle, IV, '06 (D).
Manager, Haverhill Credit Bureau, Haverhill, Mass.

Collonan, Herbert Joseph, II, '22 (D).
With Potter & Collonan, Moosup, Conn.

Coman, James Groesbeck, I, '07 (D).
General Manager, Mexia Textile Mills, Mexia, Texas.

Conant, Harold Wright, I, '09 (D).
Assistant Treasurer and Director, United Elastic Corporation, Easthampton, Mass.

Conant, Richard Goldsmith, I, '12 (D).
Vice-President in charge of Colored Goods, Wellington, Sears Company, 65 Worth Street, New York City.

Condon, John Andrew, Jr., IV, '41 (B.T.C.).
Chemist, Cowan Mill, Lewiston, Md.

Conklin, Jennie Grace, IIIB, '05 (C).
See Nostrand, Mrs. William L.

Connolly, Daniel Francis, Jr., VI, '35 (B.T.E.).
U. S. Inspector of Textiles, Quartermaster Department, Jeffersonville, Ind.

Connor, Thomas Francis, II, '28 (D).
Court Officer, Superior Court, Suffolk County, Boston, Mass.

Connorton, John Joseph, III, '27 (D).
Lieutenant, Chemical Warfare Service, U. S. Army.

Cook, Kenneth Bartlett, I, '13 (D).
Vice-President in Charge of Manufacturing, Manville-Jenckes Company, Manville, R. I.

Cooper, Harlan Cyril, VI, '41 (M.S.). (B.S. 1931, U. S. Naval Academy.)
Captain, Asst. O. I. C. Testing Laboratory, U. S. Marine Corps Depot, Philadelphia, Pa.

- Corbett, James Francis, IV, '28 (B.T.C.).**
With Pacific Mills, 214 Church Street, New York, N. Y.
- Corcoran, Leonard Robert, IV, '42 (B.T.C.).**
U. S. Army.
- Cote, Theodore Charles, IV, '26 (B.T.C.).**
Captain, Medical Administration Corps, U. S. Army.
- Cowan, Raymond Bernard, IV, '35 (B.T.C.).**
Of Cowan & Shain, Haverhill, Mass.
- Craig, Albert Wood, IV, '07 (D).**
Manager, Windsor Print Works, North Adams, Mass.
- Craig, Clarence Eugene, III, '02 (D).**
1730 Centre Street, West Roxbury, Mass.
- Crane, Eugene Francis, II, '33 (D).**
With East Weymouth Wool Scouring Company, East Weymouth, Mass.
- Crawford, Robert Thomas, VI, '36 (B.T.E.).**
Assistant Superintendent, Acetate Staple Department, Tennessee Eastman Corporation, Kingsport, Tenn.
- Creese, Guy Talbot, IV, '14 (D).**
General Manager, Creese & Cook Company, Danversport, Mass.
- Crowe, Joseph Bailey, IV, '25 (B.T.C.).**
Director of Laundry and Textile Research, Procter & Gamble Co., Ivorydale, Ohio.
- Culver, Ralph Farnsworth, IV, '04 (D).**
Manager and Director, Ciba Company, Inc., 61 Peck Street, Providence, R. I.
- Cummings, Edward Stanton, VI, '16 (D).**
Industrial Engineer, Ralph E. Loper Company, Greenville, S. C.
- Curran, Charles Ernest, III, '02 (C).**
Head Designer, Wood Worsted Mills, Lawrence, Mass.
- Currier, John Alva, II, '01 (D).**
Mechanical Superintendent, M. T. Stevens & Sons Co., North Andover, Mass.
- Curtin, William John, IV, '35 (B.T.C.).**
District Manager, Lowell Sun, Lowell, Mass.
- Curtis, Frank Mitchell, I, '06 (D).**
Salesman, Barney & Carey Company, Milton, Mass.
- Curtis, William Leavitt, II, '05 (C).**
- Cutler, Benjamin Winthrop, Jr., III, '04 (D).**
- D**
- Daley, Charles Lincoln, IV, '34 (B.T.C.).**
Instructor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.
- Dalton, Gregory Smith, IV, '12 (D).**
- Daly, William James, VI, '37 (B.T.E.).**
Textile Inspector, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.
- Darby, Avarad Nelson, II, '28 (D).**
Manager and Assistant Treasurer, Merrimac Hat Corporation, Greenville, Ala.
- Datar, Anant Vithal, VI, '24 (B.T.E.).**
Managing Director, Venkatesh Rang Tantu Mills, Inchalkaranji, S. M. Cy., India.
- Davidson, Sydney, III, '28 (D).**
- Davieau, Alfred Edward, VI, '16 (D).**
Manager, Engineering and Research Division, United States Testing Company, Inc., 1415 Park Avenue, Hoboken, N. J.
- Davieau, Leon Arthur, VI, '23 (B.T.E.).**
Textile Technologist, United States Rubber Company, Passaic, N. J.
- Davis, Alexander Duncan, VI, '14 (B.T.E.).**
Instructor, Northeastern University, Springfield, Mass.
- Davis, Arthur Sabin, IV, '40 (B.T.C.).**
Naval Aviator, U. S. Army.
- Dearborn, Roy S., VI, '13 (D).**
With Real Estate Department, Andover Savings Bank, Andover, Mass.
- Del Plaine, Parker Haywood, IV, '25 (B.T.C.).**
Southern Manager, Rohm & Hass Company, Inc., 1109 Independent Building, Charlotte, N. C.
- Dempsey, Phillip Edward, IV, '33 (B.T.C.).**
First Lieutenant, Corps of Engineers, U. S. Army.
- Derby, Roland Everett, IV, '22 (B.T.C.).**
Chemical Laboratory, The Derby Company, Lawrence, Mass.
- Derzawetz, Joseph, VI, '39 (B.T.E.).**
U. S. Naval Reserve, Navy Yard, Boston, Mass.
- de Sa, Francisco, VI, '18 (B.T.E.).**
Avenue da Graca, Bahia, Brazil.
- Dewey, James French, II, '04 (D).**
Woolen Manufacturer, A. G. Dewey Company, Quechee, Vt.
- Dewey, Maurice William, II, '11 (D).**
Investments, National Life Insurance Company, Montpelier, Vt.
- Dick, Henry Kendal, Jr., VI, '39 (B.T.E.).**
With Celanese Corporation of America, Narrows, Va.
- Dillon, James Henry, III, '05 (D).**
- Dion, Ernest Lorenzo, IV, '35 (B.T.C.).**
Chemist, Zinsser & Company, Hastings-on-Hudson, N. Y.
- Dods, James Barber, II, '27 (D).**
Vice-President, The Dods Knitting Company, Ltd., Orangeville, Ont.
- Dolan, William Francis, IV, '28 (B.T.C.).**
- Donald, Albert Edward, II, '04 (D).**
General Manager, Franklin Yarn Co., Franklin, Mass.
- Donohoe, Edward Joseph, VI, '34 (B.T.E.).**
Manager, New York Laboratory, United States Testing Company, Inc., 1450 Broadway, New York City.
- Donovan, Joseph Richard, IV, '24 (B.T.C.).**
- Doran, Wilbur Kirkland, II, '22 (D).**
Real Estate and Insurance, W. K. Doran Agency, Bristol, N. H.
- Dorr, Clinton Lamont, VI, '14 (D).**
General Manager, Raymond's, Inc., 356 Washington Street, Boston, Mass.
- Douglas, Walter Shelton, II, '21 (D).**
Estimator, Douglas & Co., Lowell, Mass.
- Dudley, Albert Richard, VI, '33 (B.T.E.).**
Chicopee Manufacturing Corporation, Manchester, N. H.
- Duggan, Paul Curran, IV, '31 (B.T.C.).**
Textile Chemist, Celanese Corporation of America, New York, N. Y.
- Duguid, Harry Wyatt, I, '24 (D).**
Assistant Superintendent, Maverick Mills, East Boston, Mass.
- Dunlap, Kirke Harold, Jr., VI, '30 (B.T.E.).**
Superintendent, Kenwood Mills, Ltd., Arnprior, Ont.
- Dunlap, Parker Frank, VI, '34 (B.T.E.).**
Textile Engineer, Chicopee Manufacturing Corporation, Manchester, N. H.
- Dunnican, Edward Tunis, VI, '24 (B.T.E.).**
Instructor in Textile Shop Practice, Passaic Public Schools, Passaic, N. J.
- Durgin, William Ernest, IV, '24 (B.T.C.).**
Textile Chemist, Geigy Company, Inc., 88 Broad Street, Boston, Mass.
- Dursin, Louis Jules, II, '36 (D).**
Superintendent, Rochambeau Worsted Company, Providence, R. I.
- Duval, Joseph Edward, II, '10 (D).**
Vice-President and Sales Manager, Massachusetts Mohair Plush Company, 3701 North Broad Street, Philadelphia, Pa.
- Dwight, John Francis, Jr., II, '08 (D).**
Hazel Avenue, Scituate, Mass.
- E**
- Echavarria, Luis, VI, '35 (B.T.E.).**
With Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia.
- Echecopar, Jesus Fortunato, VI, '33 (B.T.E.).**
Director-Gerente de Eguren, Echecopar y Cia. S.A. and Profesor de Tecnologia Textil en la Escuela de Ingenieros, Lima, Peru.
- Echmalian, John Gregory, VI, '16 (B.T.E.).**
Director, State Trade School, Manchester, Conn.
- Ehrenfried, Jacob Benjamin, II, '07 (C).**
District Manager, U. S. Employment Service, Lewiston, Me.
- Eichner, Albert David, VI, '42 (B.T.E.).**
730 Fort Washington Avenue, New York, N. Y.
- Eismann, Edmund, IV, '35 (B.T.C.).**
U. S. Army, Medical Detachment, Orlando Air Base, Orlando, Fla.

- Ekstrand, Frederic Lawrence, II, '39 (D).**
Flight Cadet, U. S. Army Air Corps.
- Elliot, Gordon Bayles, II, '12 (D).**
Planning Department, Pacific Mills, Worsted Division, Lawrence, Mass.
- Ellis, Charles Albert, VI, '21 (B.T.E.).**
Engineer, Scott & Williams, Inc., Laconia, N. H.
- Ellis, Dorothy Myrta, VI, '25 (B.T.E.).**
Economist, War Production Board, Washington, D. C.
- Ellis, James Oliver, VI, '29 (B.T.E.).**
With Manville Jenckes Corporation, Manville, R. I.
- Engstrom, Karl Emil, VI, '12 (D).** (S.B. 1916, Massachusetts Institute of Technology.
18 St. Luke Road, Allston, Mass.
- Enloe, Winfred Paige, I, '22 (D).**
Agent, W. A. Handley Manufacturing Company, Roanoke, Ala.
- Epstein, Edward Joseph, IV, '41 (B.T.C.).**
Ensign, U. S. Naval Reserve.
- Esielionis, Victor John, I, '39 (D).**
Second Hand, Chicopee Manufacturing Corporation of N. H., Manchester, N. H.
- Evans, Alfred Whitney, III, '03 (D).**
Apartment 312, Realty Building, Rochester, N. H.
- Evans, Paul Richard, II, '29 (D).**
District Manager, Economics Laboratory, Inc., Philadelphia, Pa.
- Evans, William Robinson, III, '03 (D).**
309 Main Street, Bradford, Mass.
- Everett, Charles Arthur, IV, '19 (B.T.C.).**
Instructor, Dyeing Department, Lowell Textile Institute, Lowell, Mass.
- F**
- Factor, Sidney Wilfred, IV, '41 (B.T.C.).**
49 Pleasant Street, Haverhill, Mass.
- Fairbanks, Almonte Harrison, II, '09 (D).**
Hollywood, Fla., P.O. Box 2062.
- Fairbanks, Evans Hobbs, VI, '35 (B.T.E.).**
Manager, J. T. Reed & Co., Charlestown, Mass.
- Falk, Stanley, VI, '40 (B.T.E.).**
Associate Inspector, Supplies and Equipment, U. S. Navy Clothing Depot, Brooklyn, N. Y.
- Farkas, Zoltan Roland, IV, '35 (B.T.C.).**
Textile Chemist, Casein Company of America, Bainbridge, N. Y.
- Farley, Clifford Albert, VI, '28 (B.T.E.).**
Physical Testing Laboratory, F. C. Huyck & Sons, Rensselaer, N. Y.
- Farmer, Chester Jefferson, IV, '07 (D).** (Ph.D. Harvard University.)
Professor of Chemistry, Northwestern University Medical School, Chicago, Ill.
- Farnsworth, Harold Vincent, VI, '16 (B.T.E.).**
Trustee, Atkinson, Haserick & Co., 152 Congress Street, Boston, Mass.
- Farr, Leonard Schaefer, II, '08 (D).**
With A. D. Ellis Mills, Inc., Monson, Mass.
- Farwell, Claude Chapman, VI, '23 (B.T.E.).**
Radio Service and Research, Farwell Radio & Television Laboratory, Groton, Mass.
- Fasig, Paul Leon, IV, '28 (B.T.C.).**
Chemist, American Chain & Cable Co., Reading, Pa.
- Fead, Robert William, II, '41 (D).**
Aviation Cadet, U. S. Army Air Corps.
- Feinberg, Benjamin, II, '27 (D).**
- Feindel, George Paul, IV, '24 (B.T.C.).**
Chief Chemist, Rock Hill Printing & Finishing Company, Rock Hill, S. C.
- Feldstein, Martin Alexander, VI, '24 (B.T.E.).**
With American Appliance Co., Albany, N. Y.
- Ferguson, Thomas Dickson, VI, '32 (B.T.E.).**
101 W. Gansevoort Street, Little Falls, N. Y.
- Ferguson, William Gladstone, III, '09 (D).**
Assistant Agent, Ludlow Manufacturing Associates, Ludlow, Mass.
- Ferris, Arthur Leon, II, '28 (D).**
Port Rowan, Ont.
- Feuerstein, James Mayer, VI, '40 (B.T.E.).**
Production Manager, Malden Knitting Mills, Malden, Mass.
- Finard, Saunders, IV, '41 (B.T.C.).**
U. S. Naval Reserve.
- Finlay, Harry Francis, IV, '10 (D).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corporation, Boston, Mass.
- Fisher, Russell Todd, VI, '14 (D).** '25 (B.T.E.).
President & Secretary, National Association of Cotton Manufacturers, 80 Federal Street, Boston, Mass.
- Fisher, Thomas Nathan, VI, '42 (B.T.E.).**
- Fiske, Starr Hollinger, II, '09 (D).**
119 Livingston Avenue, Lowell, Mass.
- Fitzgerald, John Francis, IV, '18 (B.T.C.).**
Fitzgerald's Cleansers, Winchester, Mass.
- Fitzgerald, John Francis, IV, '28 (B.T.C.).**
Manager, Textile Division, National Starch Products, Inc., 820 Greenwich Street, New York City.
- Fleischmann, Meyer, IV, '20 (B.T.C.).**
Chief Chemist, Real Silk Hosiery Mills, Inc., Indianapolis, Ind.
- Fleming, Frank Everett, IV, '06 (D).**
Superintendent, Dyeing and Finishing, Goodall Worsted Company, Sanford, Maine.
- Fletcher, Howard Varnum, III, '25 (D).**
With Colonial Beacon Oil Company, Hartford, Conn.
- Fletcher, Roland Hartwell, VI, '10 (D).**
Pressed Steel Car Company, Inc., McKees Rocks, Pa.
- Flood, Thomas Henry, IV, '27 (B.T.C.).**
Chemist, National Aniline Division, Allied Chemical & Dye Corporation, Toronto, Ont.
- Flynn, Thomas Patrick, IV, '11 (D).**
129 Edgell Street, Gardner, Mass.
- Ford, Edgar Robinson, IV, '11 (D).**
Technical Superintendent, Sayles Biltmore Bleacheries, Biltmore, N. C.
- Ford, Stephen Kenneth, IV, '28 (B.T.C.).**
Major, U. S. Army, Africa.
- Forsaith, Charles Henry, VI, '20 (B.T.E.).**
Superintendent, Nashua Manufacturing Company (Jackson Mills), Nashua, N. H.
- Forsaith, Ralph Allen, VI, '16 (B.T.E.).**
General Superintendent, Indianapolis Bleaching Co. (Bemis Bros. Bag Co.), Indianapolis, Ind.
- Forsyth, Harold Downes, VI, '23 (B.T.E.).**
Treasurer, William Forsyth & Sons Company, Lynn, Mass.
- Forsythe, George, VI, '34 (B.T.E.).**
With Johnson & Johnson, New Brunswick, N. J.
- Foss, George Woodrow, II, '38 (D).**
Mechanical Goods Salesman, U. S. Rubber Co., Boston, Mass.
- Foster, Boutwell Hyde, VI, '17 (B.T.E.).**
Manager, Textile Section, United States Rubber Products, Inc., Passaic, N. J.
- Foster, Clifford Eastman, II, '01 (D).**
Textile Inspector, Quartermaster Corps, U. S. Army, Jeffersonville, Ind.
- Fowle, Edwin Daniels, VI, '24 (B.T.E.).**
New England Representative, Textile World, 1427 Statler Building, Boston, Mass.
- Fox, David James, VI, '34 (B.T.E.).**
Assistant Superintendent, Horner Woolen Mills Company, Eaton Rapids, Mich.
- Fox, Kenneth Russell, VI, '38 (B.T.E.).**
Instructor, Textile Technology, Massachusetts Institute of Technology, Cambridge, Mass.
- Fox, Louise, VI, '40 (B.T.E.).**
Assistant Technician & Designer, Meyer Woolens, Inc., 580 Fifth Avenue, New York, N. Y.
- Fox, Theodore Webster, VI, '40 (B.T.E.).**
Aviation Cadet, U. S. Army Air Force.
- Franks, Jerome, VI, '27 (B.T.E.).** (M.S. 1929, Massachusetts Institute of Technology.)
With Marillyn Silk Mills, Phillipsburg, N. Y.
- Fredrickson, Charles Joseph, Jr., IV, '29 (B.T.C.).**
Chemist, White & Hodges, Everett, Mass.
- Freedman, David, VI, '38 (B.T.E.).**
Quartermaster Depot, Philadelphia, Pa.
- French, Wallace Howe, IV, '31 (B.T.C.).**
Overseer of Bleaching & Dyeing, Atlas Underwear Company, Richmond, Ind.
- Frost, Harold Benjamin, II, '12 (D).**
Resident Manager, Liberty Mutual Insurance Company, Brockton, Mass.

- Fuller, Allen Reed, IV, '17 (B.T.C.).**
Textile Chemist, A. E. Staley Manufacturing Company, Decatur, Ill.
- Fuller, George, I, '03 (D).**
Textile Consultant, Cox and Fuller, 320 Broadway, New York City.
- Fyfe, Robert Clark, VI, '40 (B.T.E.).**
Sergeant, U. S. Army.
- G**
- Gagnon, Roland Joseph Octave, IV, '36 (B.T.C.).**
Laboratory Technician, United States Testing Company, Inc., Hoboken, N. J.
- Gahm, George Leonhard, II, '06 (D).**
Yarn Superintendent, Wood Worsted Mills Lawrence, Mass.
- Gainey, Francis William, IV, '11 (D).**
Colorist, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Gale, Harry Laburton, III, '10 (D).**
Designer, Iselin-Jefferson Company, 90 Worth Street, New York City.
- Gallagher, Arthur Francis, IV, '30 (B.T.C.).**
Chemist, Shawshen Mills, Andover, Mass.
- Gallagher, John Waters, II, '27 (D).**
Foreman, American Hair & Felt Co., Newark, N. J.
- Garcia, Lorenzo Montero, VI, '38 (B.T.E.).**
Technical Director, Cia. Textil "El Faisan" S. A., Mexico D. F., Mexico.
- Gari, Jose Via, VI, '41 (B.T.E.).**
Superintendent, Barron-Colmena S. A., Colmena, Edo. de Mexico, Mexico.
- Garlick, Mrs. Dorothy M. (Burbeck, Dorothy M.), IV, '20 (B.T.C.).**
192 Great Road, Maynard, Mass.
- Garner, Allen Frank, II, '30 (D).**
President, Kezar Falls Woolen Company, Kezar Falls, Me.
- Garnett, Stanley Arthur, II, '41 (D).**
Lieutenant, U. S. Army, Quartermaster Corps, Camp Lee, Va.
- Garnett, Mrs. Stanley A. (Keirstead, Edith L.), III, '42 (D).**
Petersburg, Va.
- Gass, Matthew, IV, '41 (B.T.C.).**
Chemist, Quartermaster Depot, Jeffersonville, Ind.
- Gatzimos, Stephen Aristophanes, IV, '41 (B.T.C.).**
Teacher, Dracut, Mass.
- Gaudet, Walter Urban, II, '29 (D).**
Insurance Broker and Advisor, Pawtucket, R. I.
- Gay, Clarence Russel, II, '39 (D).**
Textile Inspector, Quartermaster Depot, Jeffersonville, Ind.
- Gay, Leon Stearns, Jr., II, '37 (D).**
Vice President and Superintendent, Gay Bros. Co. (Gaymont Division), Ludlow, Vt.
- Gay, Olin Dow, II, '08 (D).**
President, Gay Brothers Company, Cavendish, Vt.
- Georgacoulis, George, IV, '36 (B.T.C.).**
Chemist, E. I. du Pont de Nemours, Arlington, N. J.
- Getchell, Nelson Fletcher, IV, '38 (B.T.C.).**
Textile Chemist and Dyer, Goodall Worsted Company, Sanford, Me.
- Gianaris, George Demetrios, VI, '39 (B.T.E.).**
Textile Inspector, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.
- Gifford, Alden Ives, Jr., VI, '34 (B.T.E.).**
Assistant to Superintendent, Pepperel Mfg. Co., Blanket Division, Biddeford, Me.
- Gill, John Schofield, IV, '40 (B.T.C.).**
With Dize Awning and Tent Co., Winston-Salem, N. C.
- Gillespie, Francis Clifford, IV, '34 (B.T.C.).**
With Osgood Mills, North Andover, Mass.
- Gillie, Stanley James, I, '22 (D).**
Manager, Southern Testing House, United States Testing Company, Inc., Greensboro, N. C.
- Gillon, Sara Agnes, IIb, '06 (C).**
- Gilman, Ernest Dana, II, '26 (D).**
Men's Wear Designer & Stylist, Pacific Mills, Worsted Division, 261 Fifth Avenue, New York City.
- Gleken, Leo, IV, '32 (B.T.C.).**
Salesman & Demonstrator, United Aniline Company, Boston, Mass.
- Glowacki, Joseph, VI, '32 (B.T.E.).**
105 Salem Street, Andover, Mass.
- Glowinski, Mitchell, IV, '34 (B.T.C.).**
With Arlington Mills, Lawrence, Mass.
- Godfrey, Harold Thomas, VI, '26 (B.T.E.).**
Sales Engineer, Davis & Furber Machine Co., North Andover, Mass.
- Goldberg, George, VI, '10 (D).**
Manager, Liberty Lace and Braid Company, Boston, Mass.
- Goldenberg, Louis G., VI, '27 (B.T.E.).**
Teacher, Textiles and Science, Central High School of Needle Trades, New York City.
- Goldman, Moses Hyman, IV, '20 (B.T.C.).**
Civilian Allocation Specialist, Textile Division, W. P. E., Washington, D. C.
- Golec, Edward Lucian, III, '32 (D).**
Handkerchief Designer, Manhattan Shirt Company, New York City.
- Goller, Harold Boehlmann, II, '23 (D).**
Salesman, Clinton Company, Inc., Greenville, S. C.
- Goodhue, Amy Helen, IIb, '00 (C).**
See Harrison, Mrs. Arthur.
- Gooding, Francis Earl, IV, '19 (B.T.C.).**
Superintendent, Calco Chemical Company, Bound Brook, N. J.
- Goodwin, John Alden, VI, '40 (B.T.E.).**
Experimental Research, Whitin Machine Works, Whitinsville, Mass.
- Goosetrey, Arthur, IV, '21 (B.T.C.).**
With French Worsted Company, Woonsocket, R. I.
- Goosetrey, John Thomas, IV, '21 (B.T.C.).**
Superintendent of Dyeing and Bleaching, New York Mills, New York Mills, N. Y.
- Gottschalk, Lawrence William, VI, '28 (B.T.E.).**
Sales Office, Scott & Williams, Inc., 40 Worth Street, New York City.
- Gould, Norman Culver, VI, '19 (B.T.E.).**
Textile Designer, F. C. Huyck & Sons, Albany, N. Y.
- Graham, Robert Theodore, IV, '34 (B.T.C.).**
Inspection Department, Remington Arms Company, Utah Ordnance Plant, Salt Lake City, Utah.
- Greenbaum, Herbert Baron, III, '29 (D).**
- Greenbaum, Hyman Herbert, IV, '35 (B.T.C.).**
Proprietor, Exeter Food Center, Exeter, N. H.
- Greenberg, Archie, II, '21 (D).**
- Greendonner, George John, Jr., IV, '30 (B.T.C.).**
291 Delaware Avenue, Paterson, N. J.
- Greene, John Lester, VI, '39 (B.T.E.).**
U. S. Army Engineer Replacement Training.
- Greenwood, John Roger, II, '27 (D).**
Superintendent, W. W. Windle Company, Millbury, Mass.
- Gregory, Robert Crockett, VI, '34 (B.T.E.).**
Clothier, J. F. Gregory Sons Company, Rockland, Me.
- Griffin, Vernon Harcourt, IV, '35 (B.T.C.).**
Overseer of Dyeing and Finishing, Samson Cordage Works, Shirley, Mass.
- Grondin, Abraham Hector, IV, '41 (B.T.C.).**
First Lieutenant, U. S. Army, Chemical Warfare Service.
- Gross, Herman Peter, IV, '30 (B.T.C.).**
Plant Manager, Lincoln Rug Company, East Newark, N. J.
- Grossman, Clinton, IV, '38 (B.T.C.).**
Dyer, Lebanon Knitting Mills, Inc., Pawtucket, R. I.
- Grossman, Edward, VI, '42 (B.T.E.).**
67-19 Farro Street, Forest Hills, N. Y.
- Guild, Lawrence Winfield, VI, '27 (B.T.E.).**
President, L. W. Guild Company, Inc., 140 Harrison Avenue, Boston, Mass.
- Guilfoyle, Donald William, VI, '41 (B.T.E.).**
Aviation Cadet, U. S. Army Air Force.

- Gwinnell, George Harry, II, '25 (D).**
Superintendent, Berkshire Woolen Company, Pittsfield, Mass.
- Gyzander, Arne Kolthoff, IV, '09 (D).**
Chemist, National Aniline Division, Allied Chemical & Dye Corp., 40 Rector Street, New York City.

H

- Haddad, Nassib, VI, '23 (B.T.E.).**
Textile Engineer, General Laboratory, United States Rubber Company, Passaic, N. J.
- Hadley, Richard Francis, IV, '22 (B.T.C.).**
Sales Engineer, Parks & Woolson Machine Company, Springfield, Vt.
- Hadley, Walter Eastman, IV, '08 (D).**
Chief Chemist, Standard Coosa Thatcher Company, Rossville, Ga.
- Hadley, Wilfred Nourse, II, '22 (D).**
General Manager, Parks & Woolson Machine Company, Springfield, Vt.
- Hager, Hazen Otis, II, '21 (C).**
Manager, Suburban Gas Company and Hagar Auto Parts, Portland, Me.
- Hakanson, Gustave Warren, IV, '37 (B.T.C.).**
Asst. Supt., Standard Control Dept., Tennessee Eastman Corporation, Kingsport, Tenn.
- Hale, Alfred Sandel, IV, '09 (D).**
360 West Main Street, Rockaway, N. J.
- Hale, Ralph Edgar, IV, '31 (B.T.C.).**
Chemist, The Bell Company, Worcester, Mass.
- Hall, Frederick Kilby, VI, '24 (B.T.E.). (A.M. 1930, The George Washington University.)**
Inspector, United States Department of Agriculture, 801 Customhouse Building, Boston, Mass.
- Hall, Richard Thomas, IV, '40 (B.T.C.).**
Inspector, Quartermaster Corps, Jeffersonville, Ind.
- Hall, Stanley Arundel, IV, '31 (B.T.C.).**
Assistant Gas Engineer, Malden & Melrose Gas Light Co., Malden, Mass.
- Halsell, Elam Ryan, I, '04 (C).**
1301 18th Avenue, Meridian, Miss.
- Hamer, David Orville, IV, '42 (B.T.C.).**
Ensign, U. S. Naval Reserve.
- Hammond, Chester Twombly, II, '23 (D).**
Manager, Niagara Rug & Carpet Company, Inc., Buffalo, N. Y.
- Hanscom, Edwin Thomas, II, '27 (D).**
Superintendent, Dainty Maid Shoe Co., Haverhill, Mass.
- Hardie, Newton Gary, I, '23 (D).**
General Superintendent, Gossett Mills, Anderson, S. C.
- Hardman, Joseph Edwin, IV, '32 (B.T.C.).**
Textile Products Company, Sun Building, Lowell, Mass.
- Hardy, Philip Lewis, VI, '10 (D).**
Contractor, Andover, Mass.
- Hardy, Thomas Wadsworth, IV, '38 (B.T.C.).**
Chemist and Colorist, Calco Chemical Division, American Cyanamid Company, Boston, Mass.
- Harmon, Charles Francis, I, '99 (D).**
- Harper, Cyril Newcomb, IV, '42 (B.T.C.).**
Student, Lowell Textile Institute.
- Harpoot, Burgess Charles, VI, '38 (B.T.E.).**
- Harrington, Thomas, IV, '15 (D).**
President, Hart & Harrington, 925 Weed Street, Chicago, Ill.
- Harris, Carl Webster, II, '42 (D).**
With Harris, Emery Co., Inc., Penacook, N. H.
- Harris, Charles Edward, I, '05 (D).**
With Norwood Engineering Company, Florence, Mass.
- Harris, George Simmons, I, '02 (C).**
President and Treasurer, Riverside & Dan River Cotton Mills, Danville, Va.
- Harrison, Mrs. Arthur (Goodhue, Amy Helen), IIb, '00 (C).**
- Hart, Arthur Norman, IV, '19 (B.T.C.).**
- Hart, Howard Roscoe, I, '23 (D).**
Vice-President, Brighton Mills, Inc., Shannon, Va.
- Harwood, Ralph, IV, '35 (B.T.C.).**
Assistant Chemist, Research & Development, Quartermaster Depot, Philadelphia, Pa.

- Haskell, Walter Frank, IV, '02 (D).**
Overseer of Dyeing, Dana Warp Mills, Westbrook, Maine.
- Hassett, Paul Joseph, IV, '12 (D).**
Cortland Works Manager, L. C. Smith & Corona Typewriters, Inc., Cortland, N. Y.
- Hathaway, William Tabor, II, '26 (D).**
General Cashier, Commonwealth of Massachusetts, State House, Boston, Mass.
- Hathorn, George Wilmer, IV, '07 (D).**
Chemist, Lawrence Gas & Electric Company, Lawrence, Mass.
- Hathorne, Berkeley Lewis, IV, '24 (B.T.C.).**
Chemist, Berkeley Products Company, 114 East 32nd Street, New York City.
- Hay, Ernest Crawford, II, '11 (D).**
Superintendent, Monomac Spinning Company, Lawrence, Mass.
- Haynes, Amos Kempton, IV, '29 (B.T.C.).**
Southern Representative and Technician, Rohm & Haas Co., Inc., Atlanta, Ga.
- Heffernan, John Vincent, IV, '35 (B.T.C.).**
Dyer, Enterprise Dye Works, Woonsocket, R. I.
- Hegy, Gerard John Joseph, VI, '32 (B.T.E.).**
Dyer, Hegy's, Inc., Holyoke, Mass.
- Hendrickson, Walter Alexander, II, '11 (D).**
Manager, Max Lowenthal & Sons, Rochester, N. Y.
- Hennigan, Arthur Joseph, II, '06 (D).**
- Hetherman, Patrick Joseph, IV, '29 (B.T.C.).**
Teacher, Lowell High School, Lowell, Mass.
- Hibbard, Frederick William, IV, '25 (B.T.C.).**
Lieutenant (j.g.) U. S. Naval Reserve.
- Higginbottom, George Stephen, IV, '41 (B.T.C.).**
Junior Chemist, Naval Clothing Depot, Brooklyn, N. Y.
- Hildreth, Harold William, II, '07 (D).**
Westford, Mass.
- Hillman, Ralph Greeley, VI, '22 (B.T.E.).**
Production Manager, Samson Cordage Works, Boston, Mass.
- Hindle, Milton, VI, '25 (B.T.E.).**
Instructor, Department of Textile Engineering, Lowell Textile Institute, Lowell, Mass.
- Hintze, Thomas Forsyth, I, '06 (C).**
- Hobson, Edward Shackford, III, '40 (D).**
U. S. Army.
- Hockmeyer, Clive Edward, Jr., I, '40 (D).**
Process Engineer, Remington Arms, Inc., Salt Lake City, Utah.
- Hockridge, Stanley Squire, IV, '32 (B.T.C.).**
Chemist, Stein Hall & Co., Charlotte, N. C.
- Hodge, Harold Bradley, VI, '22 (B.T.E.).**
Engineer, Board of Education, Manchester, Conn.
- Hodgman, Richard Albert, VI, '36 (B.T.E.).**
Assistant Superintendent, Berkshire Division "A," Berkshire Fine Spinning Associates, Inc., North Adams, Mass.
- Hoffman, Richard Robert, II, '21 (C).**
- Holbrook, Ralph Wentworth, IV, '29 (B.T.C.).**
Chief Chemist and Chemical Purchasing Agent, Crompton Company, West Warwick, R. I.
- Holden, Arthur Newton, VI, '36 (B.T.E.).**
U. S. Army.
- Holden, Francis Crawford, IV, '09 (D).**
Chemist, Ludlow Manufacturing & Sales Company, Ludlow, Mass.
- Holden, John Sanford, II, '20 (D).**
Manufacturer, Automatic Machine Products Company, Attleboro, Mass.
- Holgate, Benjamin, III, '02 (C).**
Agent, Boott Mills, Lowell, Mass.
- Holgate, Benjamin Alexander, VI, '36 (B.T.E.).**
Associated Textile Engineer, U. S. Army Air Corps, War Department, Wright Field, Dayton, Ohio.
- Hollings, James Louis, I, '05 (D).**
Eastern Sales Manager, Lithgow Corporation, 36 West 44th Street, New York, N. Y.
- Hollstein, William Diedrick, VI, '25 (B.T.E.).**
Physician, Westfield, N. J.
- Holmes, Otis Milton, VI, '13 (B.T.E.).**
Draftsman, United Shoe Machinery Corporation, Beverly, Mass.
- Holt, Laurence Currier, VI, '29 (B.T.E.).**
Textile Technician, Celanese Corporation of America, Amelle, Md.

J

Hood, Leslie Newton, IV, '12 (D).
R.F.D. No. 4, Box 164, Selma, Ala.

Hook, Russell Weeks, IV, '05 (D).
Textile Chemist, Arthur D. Little, Inc., 30 Charles River Road, Cambridge, Mass.

Hooper, Clarence, IV, '27 (B.T.C.).
Head Dyer, Armco Finishing Corporation, Greensboro, N. C.

Horne, James Albert, I, '24 (D).
Salesman, Wellington, Sears Co., Inc., 65 Worth Street, New York City.

Horsfall, George Gordon, II, '04 (C).
Assistant Dyer, Interwoven Mills, Inc., Martinsburg, W. Va.

Horton, Chester Temple, VI, '14 (B.T.E.).
Wilmington, Mass.

Hosmer, Frank Barbour, IV, '31 (B.T.C.).
Salesman, U. S. Dyestuff Corporation, Boston, Mass.

Houghton, Robert Kingsbury, IV, '23 (B.T.C.).
Chief Chemist, Bigelow-Sanford Carpet Company, Inc., Thompsonville, Conn.

Howard, Lorne Fernley, IV, '32 (B.T.C.).
Production Chemist, B. B. Chemical Company, South Middleton, Mass.

Howard, Winfield Hersey, IV, '38 (B.T.C.).
Ensign, A-V (P), U. S. Naval Reserve, Naval Flight Instructor's School, Bloomsbury, Pa.

Howarth, Charles Lincoln, IV, '17 (B.T.C.).
Assistant Professor of Dyeing, Lowell Textile Institute, Lowell, Mass.

Howe, Woodbury Kendall, I, '10 (D).
With Lorraine Manufacturing Co., Pawtucket, R. I.

Howorth, Harmon, VI, '30 (B.T.E.).
Celanese Corporation of America, Narrows, Va.

Hoyt, Charles William Henry, IV, '07 (D).
Civil Engineer, Chemical Construction Corp., 30 Rockefeller Plaza, New York, N. Y.

Hsu, Hsueh-Chang, VI, '23 (B.T.E.).

Hubbard, Harold Harper, I, '22 (D).
With Columbus Manufacturing Company, 40 North Street, New York City.

Hubbard, Ralph King, IV, '11 (D).
President and Treasurer, Packard Mills, Inc., Webster, Mass.

Huising, Geronimo Huerva, I, '08 (D).

Hull, Robert Barney, VI, '40 (B.T.E.).
Textile Engineer, United States Testing Company, Inc., Hoboken, N. J.

Hunt, Chester Lansing, III, '05 (C).

Hunter, Robert Arnold, VI, '42 (B.T.E.).
Ensign, U. S. Naval Reserve.

Hunton, John Horace, II, '11 (D).
Personnel Director, L. S. Starrett Co., Athol, Mass.

Hurd, Ira Swain, IV, '29 (B.T.C.).
Demonstrator, Rohm & Haas Co., 222 West Washington Square, Philadelphia, Pa.

Hurtado, Leopoldo, VI, '10 (D).

Hurwitz, Jacob, IV, '23 (B.T.C.).

Hutton, Clarence, III, '03 (C).
Advertising, Davis & Furber Machine Company, North Andover, Mass.

Huyck, William Francis, II, '34 (D).
Despatcher, Pratt & Whitney Aircraft, East Hartford, Conn.

Hyman, Wolfred, II, '28 (D).
Men's Clothier, Hyman Brothers, Boston, Mass.

I

Inkpen, Norman Alfred, IV, '41 (B.T.C.).
Textile Chemist and Colorist, Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J.

Ireland, Wilson Gerard, VI, '36 (B.T.E.).
Assistant to Felt Designer, F. C. Huyck & Sons, Albany, N. Y.

Irvine, James Andrew, VI, '17 (B.T.E.).
Major, C. E. Chief, Civilian Branch Personnel Division, U. S. Army, Post Headquarters, Fort Belvoir, Va.

Isaacson, George Franklin, II, '26 (D).
Salesman, Clarence S. Brown Co., Inc., 40 Worth Street, New York City.

Ivers, Gerald Anthony, IV, '31 (B.T.C.).
Ensign, U. S. Naval Reserve.

Jaeger, Robert William, IV, '23 (B.T.C.).
Department Head, Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Ill.

James, Ernest Peter, IV, '42 (B.T.C.).
Ensign, U. S. Naval Reserve.

Jarek, Helen Jane, IV, '39 (B.T.C.).
Teacher, High School, Lowell, Mass.

Jarek, Julius, IV, '31 (B.T.C.).
Inspector of Textiles, Quartermaster Depot, Philadelphia, Pa.

Jay, Joshua Daniel, VI, '42 (B.T.E.).
Textile Inspector, Quartermaster Depot, Philadelphia, Pa.

Jelleme, William Oscar, I, '10 (D).
Director of Development, Pacific Mills, 214 Church Street, New York City.

Jen, Shang Wu, I, '21 (D).

Jessen, Robert Frederick, I, '36 (D).
Superintendent, Stanley Mills, Inc., Stanley, N. C.

Jessop, Charles Clifford, VI, '22 (B.T.E.).
145 Vandelinda Avenue, Teaneck, N. J.

Johnson, Arthur Kimball, IV, '13 (D). (S.B. 1917, Massachusetts Institute of Technology.)
Chemist, Neidich Process, Division of Underwood Elliot Fisher Corporation, Burlington, N. J.

Johnson, George Henry, IV, '20 (B.T.C.).
General Manager, American Institute of Laundering, Joliet, Ill.

Johnson, Norman Albin, IV, '31 (B.T.C.).
Managing Editor, American Dyestuff Reporter, Howes Publishing Company, Inc., 440 Fourth Avenue, New York City.

Johnson, Philip Stanley, IV, '24 (B.T.C.).

Johnston, Lee Gale, IV, '37 (B.T.C.).
Textile Chemist, American Institute of Laundering, Joliet, Ill.

Jones, Bliss Morris, IV, '30 (B.T.C.).
Sales Manager, Rodney Hunt Machine Company, Orange, Mass.

Jones, Charles Andrews, Jr., VI, '41 (M.S.).
(B.S. 1919, Virginia Military Institute—M.S. 1927, University of Wisconsin.)
Major, U. S. Army, Overseas.

Jones, Everett Amos, III, '05 (D).
3 Park Place, Auburn, N. Y.

Jones, Nathaniel Erskine, I, '21 (D).
Assistant Professor, Cotton Yarn Department, Lowell Textile Institute, Lowell, Mass.

Joslin, Harold Wheeler, II, '28 (D).
Merchant, Cut Rate Store, Windsor, Vt.

Joy, Thomas, VI, '26 (B.T.E.).
Sales Engineer, Gulf Oil Corporation, Boston, Mass.

Jury, Alfred Elmer, IV, '04 (D).
Agent, Winnsboro Mills, Winsboro, S. C.

K

Kaatze, Julius, VI, '22 (B.T.E.).

Kaiser, J. Raymond, VI, '36 (B.T.E.).
Lieutenant (j.g.), U. S. Naval Reserve, Bureau of Aeronautics, Washington, D. C.

Kane, Roger Hugh, II, '38 (D).
Assistant Superintendent, Madison Woolen Co., Madison, Me.

Kao, Chieh-Ching, VI, '23 (B.T.E.).

Kaplan, Samuel Gilbert, IV, '38 (B.T.C.).
Junior Inspector of Textiles, U. S. A. Quartermaster Depot, Philadelphia, Pa.

Karanfilian, John Hagop, VI, '21 (B.T.E.).

Kay, Harry Pearson, II, '09 (D).
Associate Member, Penn Mutual Life Insurance Company, Boston, Mass.

Keirstead, Edith Louise, III, '42 (D). See Mrs. Stanley A. Garnett.

Kelakos, Charles George, VI, '38 (B.T.E.).
Lieutenant, Air Corps, Communications Office, U. S. Army.

Kelly, Warren Thomas, VI, '38 (B.T.E.).
Textile Inspector, Quartermaster Depot, Philadelphia, Pa.

Kendall, Charles Henry, II, '23 (D).
Superintendent, Bridgewater Woolen Company, Bridgewater, Vt.

- Kennedy, Francis Charles, VI, '26 (B.T.E.).**
Textile Engineer, United States Rubber Company, Detroit, Mich.
- Kennedy, James Harrington, Jr., VI, '36 (B.T.E.), '40 (M.S.).**
Lieutenant, Quartermaster Depot, Philadelphia, Pa.
- Kennedy, Robert Miller, VI, '38 (B.T.E.).**
Assistant Technologist, Quartermaster Corps, 1100 So. Broad St. Philadelphia, Pa.
- Kenney, Frederick Leo, II, '27 (D.).**
Mill Superintendent, Uxbridge Worsted Company, Pascoag, R. I.
- Kent, Clarence LeBaron, III, '06 (C.).**
Dealer, Socony Vacuum Oil Company, South Portland, Me.
- Keough, Wesley Lincoln, II, '10 (D.).**
Clerk of Police Court, Pasadena, Calif.
- Kidder, Glen Mortimer, IV, '34 (B.T.C.).**
U. S. Army, Chemical Warfare Service.
- Kiernan, James Vincent, VI, '40 (B.T.E.).**
Lieutenant, U. S. Army.
- Killheffer, John Vincent, IV, '28 (B.T.C.).**
Laboratory Manager, E. I. du Pont de Nemours & Co., Inc., Dyestuffs Division, Charlotte, N. C.
- Kilmartin, John Joseph, I, '31 (D.).**
Department of Public Health, Lowell, Mass.
- King, Daniel Joseph, IV, '32 (B.T.C.).**
With American Hide & Leather Co., Lowell, Mass.
- Klosowicz, Edward Joseph, VI, '38 (B.T.E.).**
Private, 1st Class, U. S. Army.
- Knight, Richard Greene Howland, Jr., VI, '38 (B.T.E.).**
U. S. Army.
- Knowland, Daniel Power, IV, '07 (D.).**
Chemist, Geigy Company, Inc., 89 Barclay Street, New York City.
- Knox, Joseph Carleton, VI, '23 (B.T.E.). (S.M. 1937, Harvard University.)**
Assistant Sanitary Engineer, Massachusetts Department of Public Health, Boston, Mass.
- Kokoska, Michael George, VI, '33 (B.T.E.).**
- Kolsky, Samuel Irving, IV, '30 (B.T.C.).**
Manager, Kolsky Jewelry Co., Lawrence, Mass.
- Kopatch, Chester Marion, IV, '35 (B.T.C.).**
Dyestuff Salesman, Ciba Company, Boston, Mass.
- Koroskys, Michael Joseph, II, '41 (D.).**
- Kostopoulos, Emanuel Arthur, VI, '30 (B.T.E.).**
Aviation Cadet, Army Air Force Classification Center, San Antonio, Texas.
- Koulass, Stanley Charles, IV, '41 (B.T.C.).**
- Krishan, Maharaj, VI, '30 (B.T.E.).**
Montgomery, India.
- Kuo, Limao, VI, '26 (B.T.E.).**
In charge of Quality Testing Division, Shanghai Bureau of Inspection and Testing of Commercial Commodities, Shanghai, China.
- L**
- Lamb, Arthur Franklin, II, '10 (D.).**
In business, Cleansing and Dyeing, Lamb's Cleaning, Rockland, Maine.
- Lamont, Robert Laurence, II, '12 (D.).**
Vice President, L. F. Grammes & Sons, Inc., Allentown, Pa.
- Lamprey, Leslie Balch, IV, '16 (B.T.D.).**
Lawrence Post Office, Lawrence, Mass.
- Lamson, George Francis, I, '00 (D.).**
With Riley Stoker Corporation, Worcester, Mass.
- Landfield, Harold, IV, '41 (B.T.C.).**
War Department, Inspector of Chemical Warfare Materials, Boston Chemical Warfare Procurement District, Boston, Mass.
- Lane, John William, I, '06 (C.).**
- Lane, Joseph James, 2nd, VI, '41 (B.T.E.).**
U. S. Army.
- Lane, Mrs. Joseph J., 2nd (Woodard, Alice M.) VI, '41 (B.T.E.).**
Textile Testing, Gatke Asbestos Textile Corp., North Brookfield, Mass.
- Lane, Oliver Fellows, IV, '15 (B.T.D.).**
Technical Service, Sales Department, Krebs Pigment and Color Corp., Newark, N. J.
- Lanner, Arthur William, IV, '40 (B.T.C.).**
U. S. Army.
- Larratt, John Francis, II, '22 (D.).**
Gift Studio, Studio 5, El Paso, Santa Barbara, Calif.
- Lau, Ching Sut, VI, '42 (B.T.E.).**
Research Department, The Clark Thread Co., Newark, N. J.
- Lauder, Robert William, VI, '35 (B.T.E.).**
Abbot Worsted Company, Forge Village, Mass.
- Laughlin, James Knowlton, III, '09 (D.).**
- Laurin, Eric Thurston Lawrence, IV, '21 (B.T.C.).**
Director of Textile Service, Calgon, Inc., 300 Ross Street, Pittsburgh, Pa.
- Laurin, Sven Albert, IV, '23 (B.T.C.).**
Minister, Tenney Memorial Church, Salem, N. H.
- Lawson, Russell Monroe, VI, '34 (B.T.E.).**
First Lieutenant, U. S. Army.
- Leavitt, George Herbert, II, '26 (D.).**
Night Assistant Superintendent, F. C. Huyck & Sons, Albany, N. Y.
- Leblanc, Gerald Alderick, VI, '34 (B.T.E.).**
With Lowell Furniture Company, Lowell, Mass.
- Lee, Shao-fong, VI, '36 (B.T.E.).**
- Lehto, Reino Gust, III, '38 (D.).**
24 Waltham Street, Maynard, Mass.
- Leitch, Harold Watson, IV, '14 (B.T.D.).**
General Superintendent, Pacific Mills, Worsted Division, Lawrence, Mass.
- Lemieux, Robert Alphonse, IV, '38 (B.T.C.).**
Textile Chemist, Penick & Ford, Ltd., Inc., 805 Bona Allen Bldg., Atlanta, Ga.
- Lemire, Joseph Emile, VI, '21 (B.T.E.).**
Teacher of Mathematics, Lowell High School, Lowell, Mass.
- Leonard, Leo Edward, I, '27 (D.).**
- Leslie, Kenneth Everett, IV, '35 (B.T.C.).**
s/Sgt., U. S. Army.
- Levin, Samuel, IV, '39 (B.T.C.).**
Director of Dyeing, Spevack and Garbaccio, Inc., East Rutherford, N. J.
- Lewis, Dorothy Elaine, VI, '41 (B.T.E.).**
Buyer (fabrics), U. S. Rubber Co., Naugatuck, Conn.
- Lewis, George Kenneth, VI, '24 (B.T.E.).**
Divisional Sales Manager, Sonoco Products Company, Mystic, Conn.
- Lewis, LeRoy Clark, IV, '08 (D.).**
Despatcher, Wright Aeronautical Corporation, Paterson, N. J.
- Lewis, Walter Scott, IV, '05 (D.).**
Cotton Processing Division, Southern Regional Research Laboratory, U. S. Department of Agriculture, New Orleans, La.
- Liang, Leland Sung, VI, '42 (B.T.E.).**
Student, Harvard School of Business Administration, Cambridge, Mass.
- Lifland, Abraham, IV, '31 (B.T.C.).**
- Lifland, Bessie, IV, '32 (B.T.C.).**
See Appel, Mrs. Bessie L.
- Lifland, Morris, VI, '33 (B.T.E.).**
- Lillis, Marvin Hale, IV, '14 (D.).**
40 Lawrence Street, Lawrence, Mass.
- Lincoln, Charles Ernest, IV, '37 (B.T.C.).**
Superintendent, Woolen Yarn Spinning Division, Collins & Aikman Corporation, Manayunk, Philadelphia, Pa.
- Linden, Leo, VI, '41 (B.T.E.).**
Second Lieutenant, U. S. Army Air Force.
- Lindsly, Walter Coburn, IV, '29 (B.T.C.).**
Chemist, Sidney Blumenthal & Co., Inc., Rocky Mount, N. C.
- Linsey, Edward, II, '25 (D.).**
- Little, Ralph Harding, II, '39 (D.).**
Assistant Designer, M. T. Stevens & Sons, Peace Dale, R. I.
- Littlefield, Carl Richard, VI, '38 (B.T.E.).**
U. S. Air Corps.
- Lizak, Boleck Louis, IV, '40 (M.S.).**
(B.S., Lewis Institute, 1937.)
- Logan, George Leslie, VI, '28 (B.T.E.).**
Chief Expeditor, Veeder-Root, Inc., Hartford, Conn.
- Lokur, Swamirao Ramrao, IV, '35 (B.T.C.).**
With Lolani Textile Industries, Thalakwadi, Belgaum, India.

- Lombard, Carleton Joshua, VI, '23 (B.T.E.).**
Vice-President, Riggs & Lombard, Textile Machinery, Lowell, Mass.
- Loney, Robert William, II, '22 (D).**
- Longbottom, Parker Wyman, IV, '21 (B.T.C.).**
Dyer, Claremont Waste Manufacturing Company, Claremont, N. H.
- Loveless, Everett Hanscom, VI, '31 (B.T.E.).**
With American Viscose Corporation, Marcus Hook, Pa.
- Lowe, John Charles, VI, '34 (B.T.E.), '40 (M.S.).**
Assistant Professor, Department of Worsted Yarns, Lowell Textile Institute, Lowell, Mass.
- Lowe, Philip Russell, VI, '24 (B.T.E.).**
Adjuster, Factory Mutuals, Charlotte, N. C.
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Head of Diesel & Gas Engine Section, Ship Building Division, War Production Board, Washington, D. C.
- Lussier, Joseph Adrién, II, '27 (D).**
Staff Superintendent, Hood Rubber Company, Inc., Watertown, Mass.
- Lutz, Helmut Erich, IV, '38 (B.T.C.).**
U. S. Army.
- Lyle, Robert Keith, IV, '37 (B.T.C.).**
Inspector, Quartermaster Depot, Jeffersonville, Ind.
- Lynch, Edward Mark, IV, '40 (B.T.C.).**
Chemical Technologist, Navy Department, Bureau of Ships, Washington, D. C.

M

- McAllister, Gordon Algeo, IV, '31 (B.T.C.).**
Fieldman, Middlesex County Agricultural Conservation Association, Concord, Mass.
- McBee, Mrs. Damon F. (Warren, E. Mabelle), IV, '28 (B.T.C.).**
Chemist, Warwick Mills, Laboratory Division, Boston, Mass.
- McCann, John Joseph, Jr., VI, '24 (B.T.E.).**
Textile Machine Designer, The McCann Company, River Works, Andover, Mass.
- McCartney, Robert Wallace, IV, '42 (B.T.C.).**
Corporal, U. S. Army, Detach. Med. Dept., Asford General Hospital, White Sulphur Springs, W. Va.
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Resident Manager, Sandox Chemical Works, Inc., Providence, R. I.
- Macdonald, Hector Graham, IV, '19 (B.T.C.).**
Assistant Manager, Franklin Process Company, Providence, R. I.
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Plant Chemist and Dyer, Merrimack Hat Corporation, Amesbury, Mass.
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Teacher of Testing and Dyeing, Textile High School, New York, N. Y.
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Lawyer-Judge, McDonnell & White, 40 Court Street, Boston, Mass.
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U. S. Postal Department, Lowell, Mass.
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16 Redman Terrace, Coldwell, N. J.
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Teacher, Lowell High School, Lowell, Mass.
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Assistant to Merchandise Manager, Real Silk Hosiery Mills, Inc., Indianapolis, Ind.
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(Ed.M., 1938, Boston University).
Major, U. S. Army, Overseas.
- McGuire, Edward Perkins, VI, '28 (B.T.E.).**
Lieutenant, U. S. Navy.
- MacKay, Stewart, III, '07 (D).**
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143 Park Drive, Ste. 3-7, Boston, Mass.
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Salesman, Demonstrator, American Aniline Products, Inc., 820 South Clinton Street, Chicago, Ill.
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Weaving Foreman, Shelton Looms, Shelton, Conn.
- McKinstry, James Bradley, II, '25 (D).**
Agent and Superintendent, H. T. Hayward Company, Franklin, Mass.
- McKittrick, Raymond Wellington, VI, '28 (B.T.E.).**
Vice-President, Frank G. McKittrick Co., Lowell, Mass.
- McLean, Earle Raymond, IV, '30 (B.T.C.).**
Industrial Research Fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa.
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Designer, Wuskanut Mills, Inc., Farnumsville, Mass.
- McQuade, Allan John, VI, '36 (B.T.E.).**
Textile Technologist, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.
- McQuaid, Barton Mathewman, IV, '32 (B.T.C.).**
Billerica, Mass.
- McTeague, George David, IV, '41 (B.T.C.).**
Assistant Finisher, Great Barrington Mfg. Co. Great Barrington, Mass.
- Macher, Henry II, '23 (D).**
Secretary, Central Importing Company, Inc., of New Jersey, Passaic, N. J.
- Mackie, Chauncey Jacob, II, '40 (D).**
Lieutenant, U. S. Army, Chemical Warfare Service.
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Textile Inspector, U. S. Government, Quartermaster Corps, Webster, Mass.
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Designer, Uxbridge Worsted Company, Uxbridge, Mass.
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872 Central Street, Lowell, Mass.
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Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
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Superintendent, Franklin Cotton Mill Company, Cincinnati, Ohio.
- Mahoney, Joseph Healey, IV, '38 (B.T.C.).**
Inspector, Quartermaster Depot, Jeffersonville, Ind.
- Mailey, Howard Twisden, II, '08 (D).**
Manufacturing Superintendent, Worsted Division, Pacific Mills, Lawrence, Mass.
- Manderbach, Harold Mills, VI, '37 (M.S.).**
(B.A. 1924, University of Michigan.)
Lieutenant Colonel, U. S. Army Quartermaster's Depot, Philadelphia, Pa.
- Mandikos, George John, IV, '42 (B.T.C.).**
Assistant Instructor, Lowell Textile Institute, Lowell, Mass.
- Manning, Frederick David, IV, '10 (D).**
Industrial Engineer, General Cable Corporation, Perth Amboy, N. J.
- Manning, Neil Joseph, IV, '41 (B.T.C.).**
With Pacific Mills, Lawrence, Mass.
- Marinel, Walter Newton, I, '01 (D).**
Engineer and Auto Mechanic, Morris Brothers, North Chelmsford, Mass.
- Mark, Aris Sawa, VI, '22 (B.T.E.).**
Sales Department, Franklin Manufacturing Company, Inc., 40 Worth Street, New York City.
- Markarian, Haig, IV, '33 (B.T.C.).**
Dye House, Arlington Mills, Lawrence, Mass.
- Markarian, Moushy, IV, '36 (B.T.C.).**
Chemist, Arnold Print Works, North Adams, Mass.
- Marsden, Sidney Robert, IV, '39 (B.T.C.).**
- Marshall, Chester Stanley, II, '22 (D).**
Salesman, The Spool Cotton Co., Pawtucket, R. I.
- Martin, Harry Warren, IV, '11 (D).**
Manager of Footwear, Hood Rubber Company, Inc., Watertown, Mass.
- Maslanka, Edward John Felix, IV, '40 (B.T.C.).**
Ensign, U. S. Naval Reserve, U.S.S. Washington.
- Mason, Archibald Lee, VI, '09 (D).**
Concord Road, Billerica, Mass.
- Mason, Frederick Rufus, VI, '41 (B.T.E.).**
Inspector, Kendall Finishing Co., Walpole, Mass.
- Mason, Philip Edwin, IV, '26 (B.T.C.).**
Purchasing Agent, Priorities Specialist, Watson Park Company, Ballardvale, Mass.

- Mather, Harold Thomas, VI, '13 (D).**
Inspector, Associated Factory Mutual Fire Insurance Companies, Boston, Mass.
- Mathieu, Alfred Jules, II, '20 (D).**
Textile Executive—Contact Man, French Worsted Company, Woonsocket, R. I.
- Matthews, Elmer Clark, II, '17 (D).**
Treasurer and General Manager, Thermo Mills, Inc., Hudson, N. Y.
- Matthews, Raymond Lewis, IV, '34 (B.T.C.).**
Lieutenant (j.g.), U. S. Naval Reserve.
- Matthews, Robert Jackson, VI, '29 (B.T.E.).**
Sergeant, U. S. Army.
- Mauersberger, Herbert Richard Carl, III, '18 (D).**
Technical Editor, Rayon Textile Monthly, 303 Fifth Avenue, New York City.
- Mazer, Samuel, IV, '26 (B.T.C.).**
In business, Dyer and Converter of Yarns, S. Mazer & Co., Allston, Mass.
- Meadows, William Ransom, I, '04 (D).**
Chief, Raw Cotton Unit, War Production Board, Washington, D. C.
- Meehan, John Joseph, IV, '32 (B.T.C.).**
Textile Colorist, Warwick Print Works, Bound Brook, N. J.
- Meek, Lotta, IIb, '07 (C).**
See Parker, Mrs. Herbert L.
- Meeker, Samuel, IV, '27 (B.T.C.).**
Chemist, Aridye Corporation, Fairlawn, N. J.
- Megas, Charles, IV, '37 (B.T.C.).**
Inspector of Textiles, War Department, Quartermaster Depot, Philadelphia, Pa.
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Supervisor, Top Dyeing and Bleaching, Lorraine Manufacturing Company, Pawtucket, R. I.
- Mejia, Eduardo, B.S., I, '40 (D).**
Medellin, Colombia, S. A.
- Merchant, Edith Clara, IIb, '00 (C).**
Art Supervisor, Public Schools, Lowell, Mass.
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Instructor in Weaving, Lowell Textile Institute, Lowell, Mass.
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Aviation Cadet, U. S. Army.
- Meyers, Chester William, IV, '27 (B.T.C.).**
First Lieutenant, U. S. Army, Chemical Warfare Service, Overseas.
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2 Freeman Street, Haverhill, Mass.
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Salesman, E. I. du Pont de Nemours & Co., 140 Federal Street, Boston, Mass.
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Plant Supervisor, Monterey Undergarment Co., Inc., East Newark, N. J.
- Miller, Arnold Irving, IV, '39 (B.T.C.).**
Junior Inspector of Textiles, U. S. A. Quartermaster Corps, Philadelphia, Pa.
- Miller, Joshua, VI, '24 (B.T.E.).**
Material Engineer, Naval Aircraft Factory, Navy Yard, Philadelphia, Pa.
- Minge, Jackson Chadwick, I, '01 (C).**
- Mintz, Irving Paul, IV, '41 (B.T.C.).**
Foreman, Eureka Printing Co., Clifton, N. J.
- Mirsky, Leon Robert, II, '19 (D).**
- Mitchell, Charles Alvah, II, '24 (D).**
- Moller, Ernest Arthur, II, '22 (D).**
Manager, Bicycle & Motorcycle Tire Sales, The Goodyear Tire & Rubber Co., Inc., Akron, Ohio.
- Molloy, Francis Henry, II, '16 (D).**
Salesman, F. C. Huyek & Sons, Albany, N. Y.
- Monahan, Harold Joseph, IV, '39 (B.T.C.).**
U. S. Army.
- Moody, Leon Eugene, IV, '34 (B.T.C.).**
Resident Manager, U. S. Finishing Company, Sterling, Conn.
- Moore, Edward Francis, II, '25 (D).**
Superintendent, The Adler Company, Cincinnati, Ohio.
- Moore, Everett Byron, I, '05 (D).**
Superintendent, Bridgeport Fabrics, Bridgeport, Conn.
- Moore, William Joseph, IV, '21 (B.T.C.).**
Colorist, Pacific Mills, Lawrence, Mass.
- Moorehouse, William Roy, IV, '01 (D).**
50 Commonwealth Avenue, Boston, Mass. Retired—on call by National Aniline Division, Allied Chemical & Dye Corp., Boston, Mass.
- Moran, Edward Francis, IV, '32 (B.T.C.).**
Custom Examiner's Aid, U. S. Customs Service, Treasury Department, Philadelphia, Pa.
- Moreau, Arthur Joseph, IV, '42 (B.T.C.).**
U. S. Army, Medical Detachment Station Hospital, Lake Louise, Toccoa, Ga.
- Moreno, Emilio Gomez, Jr., VI, '36 (B.T.E.).**
Draftsman, Whitin Machine Works, Whitinsville, Mass.
- Morrill, Howard Andrew, VI, '16 (D).**
- Morris, Merrill George, IV, '21 (B.T.C.).**
Chemist, National Aniline Division, Allied Chemical & Dye Corp., 357 West Erie Street, Chicago, Ill.
- Morrison, Haven Asa, IV, '25 (B.T.C.).**
Salesman, Ciba Company, Inc., Boston, Mass.
- Morrison, Roland Charles, IV, '34 (B.T.C.).**
Salesman, Calco Chemical Division, American Cyanamid Company, Boston, Mass.
- Morse, Judson Pickering, II, '33 (D).**
With Eagle Oil & Supply Co., South Boston, Mass.
- Mullaney, John Francis, VI, '20 (B.T.E.).**
Maintenance Superintendent, Lawrence Print Works, Inc., Lawrence, Mass.
- Mullen, Arthur Thomas, II, '09 (D).**
Industrial Manager, Commonwealth of Massachusetts, West Concord, Mass.
- Munroe, Sydney Philip, I, '12 (D).**
Chief Cost Accountant, Wellington Sears Company, New York, N. Y.
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Textile Research Chemist, National Starch Products, Inc., 820 Greenwich Street, New York, N. Y.
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U. S. Inspector, Quartermaster Depot, Jeffersonville, Ind.
- Murphy, John Anthony, IV, '42 (B.T.C.).**
Ensign, U. S. Naval Reserve.
- Murphy, John Joseph, IV, '33 (B.T.C.).**
Assistant Chemist, Bates Manufacturing Company, Lewiston, Me.
- Murray, James, IV, '13 (D).**
Chemist and Superintendent, Martin Cantine Company, Saugerties, N. Y.
- Murray, James Andrew, II, '10 (D).**
Analyst, Massachusetts Unemployment Compensation Commission, Boston, Mass.
- Myers, Walter Flemings, VI, '29 (B.T.E.).**
Branch Salesman, Atlantic Register Company, Waltham, Mass.

N

- Nary, James Anthony, II, '22 (D).**
Manager, United States Testing Company, Inc., Chicago, Ill.
- Natsios, Basil Andrew, IV, '37 (B.T.C.).**
Senior Inspector of Textiles, Quartermaster Depot, Jeffersonville, Ind.
- Nelson, Roy Clayton, II, '21 (C).**
Resident Manager, Assabet Mills, Maynard, Mass.
- Nelson, Russell Sprague, VI, '22 (B.T.E.).**
With Draper Corporation, Hopedale, Mass.
- Nelson, William Arthur, IV, '40 (B.T.C.).**
Inspector of Textiles, War Department, Quartermaster Depot, Jeffersonville, Ind.
- Nerney, Francis Xavier, IV, '37 (B.T.C.).**
Textile Chemist, Buffalo Electro Chemical Co., Buffalo, N. Y.
- Neugroschl, Sigmond Israel, I, '21 (D).**
- Newall, J. Douglas, IV, '09 (D).**
22 South Main Street, Derry Village, N. H.
- Newcomb, Guy Houghton, IV, '06 (C).**
Manager, Philadelphia Dye Sales, E. I. du Pont de Nemours & Co., 1616 Walnut Street, Philadelphia, Pa.
- Neyman, Julius Ellis, IV, '15 (B.T.D.).**
Furniture Dealer, Neyman Furniture Company, Lowell, Mass.
- Nichols, Raymond Elmore, VI, '10 (D).**
522 Pine St., Lowell, Mass.

- Niven, Robert Scott, VI, '12 (D).
Draftsman, General Electric Company, Lynn,
Mass.
Noonan, Paul Francis, IV, '42 (B.T.C.).
U. S. Army Air Corps.
Nostrand, Mrs. William L. (Conklin, Jennie
Grace), IIIB, '05 (C).
Nuttall, Andrew Frederick, IV, '40 (B.T.C.).
Aviation Cadet, U. S. Army Air Force.

O

- O'Brien, Philip Francis, II, '15 (D). (B.S. New
York University, M.A. Fordham Uni-
versity.)
Chairman, Textile Department, Textile High
School, New York City.
Ocoma, Estanislao Manaois, B.S., VI, '39
(B.T.E.).
Textile Engineer, National Development Com-
pany Textile Mills, Manila, P. I.
O'Connell, Clarence Edward, IV, '11 (D).
Dyer, National Aniline Division, Allied Chem-
ical & Dye Corporation, Buffalo, N. Y.
O'Connor, Lawrence Dennis, VI, '17 (D).
With Beggs & Cobb, Winchester, Mass.
O'Donnell, John Delaney, I, '04 (C).
O'Donoghue, Eileen Margaret, VI, '39 (B.T.E.).
See Chapman, Mrs. Boyd P., Jr.
O'Hara, William Francis, IV, '04 (C).
Chemist, Original Bradford Soap Works, West
Warwick, R. I.
Okun, Seymour, VI, '41 (B.T.E.).
Research Laboratory, J. P. Stevens & Co., 44
Leonard Street, New York, N. Y.
Olsen, Earl Edward, VI, '38 (B.T.E.).
Textile Engineer, Chicopee Manufacturing
Corporation of New Hampshire, Manchester,
N. H.
Olsen, Herbert Charles, IV, '39 (B.T.C.).
U. S. Army.
Olson, Carl Oscar, II, '24 (D).
Proprietor, Budget Beauty Salon, Hartford,
Conn.
Oppenheim, Morton Lewis, VI, '42 (B.T.E.).
Aviation Cadet, U. S. Army.
Orlauski, Anthony, IV, '32 (B.T.C.).
Dyer, Bradford Dyeing Association, Bradford,
R. I.
Orr, Andrew Stewart, IV, '22 (B.T.C.).
Manager, Storey & Co., Brockton, Mass.
Osborne, George Gordon, VI, '28 (B.T.E.).
(M.Sc. 1932, North Carolina State Col-
lege.)
With Wellington, Sears Company, Boston,
Mass.
Othote, Louis Joseph, I, '23 (D).
Sales and merchandising, J. W. Valentine Co.,
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P

- Paige, Walter Hale, Jr., VI, '38 (B.T.E.).
Paul Whitin Manufacturing Company, North-
bridge, Mass.
Palais, Samuel, IV, '18 (B.T.C.).
With Worcester Knitting Company, Worcester,
Mass.
Pappas, Vasil James, IV, '42 (B.T.C.).
Aviation Cadet, U. S. Army.
Parechanian, James Humphrey, IV, '35
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U. S. Chemical Warfare Service, Boston, Mass.
Parigian, Harold Hrant, IV, '28 (B.T.C.).
Parker, Everett Nichols, I, '05 (D).
President, Parker Spool and Bobbin Company,
27-53 Middle Street, Lewiston, Maine
Parker, Mrs. Herbert L. (Meek, Lotta L.),
IIIB, '07 (C).
Parker, Hubert Frederic, VI, '20 (B.T.E.).
Mill Engineer, Castanea Paper Company,
Lock Haven, Pa.
Parker, John George, Jr., IV, '31 (B.T.C.).
Assistant Superintendent, Stanley Woolen
Company, Uxbridge, Mass.
Parkin, Robert Wilson, VI, '27 (B.T.E.).
Production Manager, Limerick Yarn Mills,
Limerick, Me.
Parkis, William Lawton, I, '09 (D).
President and General Manager, Connecticut
Cordage Company, North Oxford, Mass.
Parsons, Charles Sumner, VI, '27 (B.T.E.).
Superintendent, Hathaway Manufacturing
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Patrick, Stephen Edmund, Jr., I, '41 (D).
With Saco-Lowell Shops, Biddeford, Maine.
Patsourakos, James Peter, IV, '39 (B.T.C.).
Lieutenant, U. S. Army Air Corps
Peabody, Roger Merrill, II, '16 (D).
Application Engineer, Scovil Manufacturing
Company, Waterbury, Conn.
Pearlstein, Maxwell, III, '28 (D).
Proprietor, Abbotsford Pharmacy, Roxbury,
Mass.
Pearsall, Samuel, II, '42 (D).
Aviation Cadet, U. S. Army.
Pearson, Alfred Henry, IV, '11 (D).
Demonstrator and Salesman, Ciba Company,
Inc., 157 Federal Street, Boston, Mass.
Peary, John Ervin, III, '31 (D).
Superintendent, Hampshire Woolen Co., Ware
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Pease, Chester Chapin, I, '09 (D).
With Jackson Mills, Nashua, N. H.
Pease, Kilburn Gray, I, '38 (D).
Inspector of Textiles, Quartermaster Depot,
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Peck, Carroll Wilmot, IV, '13 (D).
Vice-President, George Mann & Co., Inc.,
Providence, R. I.
Pelt, Joseph Paul, Jr., VI, '40 (B.T.E.).
Assistant Manager and Secretary, Groblue
Sportswear, Newark, N. J.
Penney, Cabot William, III, '33 (D).
Assistant Superintendent and Designer, Wyand-
otte Worsted Company, Pittsfield, Mass.
Perkins, John Edward, III, '00 (D).
24 Abbott Street, Pittsfield, Mass.
Perkins, J. Dean, III, '08 (D).
Superintendent, Arms Textile Manufacturing
Company, Manchester, N. H.
Perlman, Samuel, IV, '17 (B.T.C.). (LL.B.
1927, New Jersey Law School.)
Perlmutter, Barney Harold, IV, '23 (B.T.C.).
Treasurer, Mallon Mattress Corp., Boston,
Mass.
Pernick, David, VI, '41 (B.T.E.).
Production Engineer, Joseph Pernick Co.,
Maspeth, L. I., N. Y.
Pero, Henry Leland, VI, '41 (B.T.E.).
Instructor, Wool Department, Lowell Textile
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Pero, Richard Omer, II, '31 (D).
Assistant Superintendent, Amos Abbot Com-
pany, Dexter, Me.
Pesetzky, Herbert, III, '42 (D).
U. S. Army.
Peterson, Eric Arthur, IV, '31 (B.T.C.).
Care Thomas Ward, 552 West 98th Street,
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Petty, George Edward, I, '03 (C).
Real Estate, 211 Ashe Street, Greensboro, N.C.
Phaneuf, Maurice Philippe, III, '20 (D).
Accountant, Librairie St. Michel, Inc., Boston,
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Phelan, Bernard Michael, IV, '29 (B.T.C.).
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Allied Chemical & Dye Corp., 351 Abbott
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Phelan, Leonard John, IV, '35 (B.T.C.).
U. S. Army, Chemical Warfare Service.
Phillips, Maurice Gordon, VI, '41 (B.T.E.).
U. S. Army.
Pierce, George Whitwell, IV, '25 (B.T.C.).
Superintendent of Dyeing and Finishing,
Kramer Hosiery Company, Nazareth, Pa.
Piligan, Hiag Nishan, IV, '32 (B.T.C.).
U. S. Marine Corps, Depot of Supplies, Phila-
delphia, Pa.
Pillsbury, Ray Charles, I, '13 (D).
Sales Agent, Universal Winding Company,
Providence, R. I.
Pizzuto, Joseph James, Jr., IV, '33 (B.T.C.).
Teacher, Central High School of Needle Trades,
New York, N. Y.
Plaisted, Webster E., II, '18 (D).
General Manager, Pacific Mills, Worsted Divi-
sion, Lawrence, Mass.

Platt, Walter Wallace, IV, '41 (B.T.C.). '42 (M.S.).
9 Kenwood Place, Lawrence, Mass.

Ploubides, John Peter, IV, '38 (B.T.C.).
Colorist, Pacific Mills, Worsted Division, Lawrence, Mass.

Plovnick, Max David, IV, '35 (B.T.C.).
Chemist, Southern Asbestos Company, Charlotte, N. C.

Poremba, Leo Louis, IV, '35 (B.T.C.).
Senior Textile Inspector and Supervisor, Quartermaster Depot, Philadelphia, Pa.

Portilla, Jose Luis, VI, '41 (B.T.E.).
Manager, Hilos Continental, S. A., Col. Agricola Oriental, Mexico.

Potter, Carl Howard, I, '09 (D).
Sales Agent for Mills, 100 Worth Street, New York City.

Pottinger, James Gilbert, II, '12 (D).
President, Treasurer and General Manager, Everlastik, Inc., 181 Spencer Avenue, Chelsea, Mass.

Powers, Walter Wellington, IV, '20 (B.T.C.).

Pradel, Alois Joseph, III, '00 (D).
Designer, Killingly Worsted Company, Danielson, Conn.

Pradel, Mrs. Alois J. (Walker, Anna G.), IIIB, '03 (C).
78 Broad Street, Danielson, Conn.

Pratt, Caroline Elizabeth, IV, '42 (B.T.C.).
Chemist, Arlington Mills, Lawrence, Mass.

Precourt, Joseph Octave, VI, '21 (B.T.E.).
Vice-President, January & Wood Co., 222 West Adams Street, Maysville, Ky.

Prescott, Walker Flanders, IV, '09 (D).
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Prescott, William Benjamin, IV, '39 (B.T.C.).
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Preston, Harold Lawrence, VI, '30 (B.T.E.).
U. S. Navy.

Prien, Walter Ferdinand, U.S.N., VI, '39 (M.S.) (B.S., U. S. Naval Academy, 1930).
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Pulliafico, Salvatore Joseph, IV, '41 (B.T.C.).
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Putnam, George Ives, IV, '16 (B.T.D.).
With Asbestos Textile Co., North Brookfield, Mass.

Putnam, Leverett Nelson, IV, '10 (D).
Overseer of Dyeing, Pacific Mills, Worsted Division, Lawrence, Mass.

Putnam, Philip Clayton, IV, '13 (D).
Foreman Dyer, Apponaug Company, Apponaug, R. I.

Q

Qualey, Francis Joseph, IV, '38 (B.T.C.).
Installer-Repairman, New England Telephone & Telegraph Company, Lawrence, Mass.

Quigley, Gerald Francis, IV, '31 (B.T.C.).
Boss Dyer, Hampton Co., Easthampton, Mass.

Quinlan, William Harold, VI, '20 (B.T.E.).

R

Radford, Garland, II, '20 (D).
President, Oriental Textile Mills, Houston, Texas.

Ramsdell, Theodore Ellis, I, '02 (D).
President, Monument Mills, Housatonic, Mass.

Rand, Woodbury Holmes, II, '42 (D).
Dye Maker and Machinist Trainee, Harvey Radio Co., Cambridge, Mass.

Rashkin, Bernard, VI, '41 (B.T.E.).
Time Study and Methods, Maidenform Brasiere Co., Bayonne, N. J.

Rawlinson, Dustin, IV, '42 (B.T.C.).
Ensign, U. S. Naval Reserve.

Rawlinson, Richard William, VI, '31 (B.T.E.).
Supervisor of Projectile Dept., Whitin Machine Works, Whitinsville, Mass.

Ray, Lloyd Sanford, IV, '30 (B.T.C.).
Assistant Superintendent, Rust Proofing and Metal Finishing Corp., Cambridge, Mass.

Raymond, Charles Abel, IV, '07 (D).
Silviculturist, Essex, Mass.

Recher, Theodore, VI, '33 (B.T.E.).
Owner, The Reclin Corporation, Milford, Mass.

Redding, Leslie Capron, II, '26 (D).
Designer, Waucantuck Mills, Uxbridge, Mass.

Reddish, Charles Warren, IV, '38 (B.T.C.).
Treasurer, City Dye Works, Springfield, Mass.

Reddish, Warren Thomas, Jr., IV, '39 (B.T.C.).
Vice-President, City Dye Works, Inc., 1159 State Street, Springfield, Mass.

Redmond, James Reynolds, IV, '36 (B.T.C.).
Textile Research & Development, U. S. Quartermaster Corps, Jeffersonville, Ind.

Reed, Everett Carlton, VI, '39 (B.T.E.).
Assistant Superintendent, Albany Felt Company, Albany, N. Y.

Reed, Harold Ernest, VI, '37 (B.T.E.).
Assistant Editor, *Textile World*, New York, N. Y.

Reed, Norman Bagnell, I, '10 (D).
President and Treasurer, Surgical Products, Inc., Lowell, Mass.

Reed, William Thorncroft, VI, '39 (B.T.E.).
Inspector, U. S. Maritime Commission Marine Engine, Whitin Machine Works, Whitinsville, Mass.

Rees, Richard Holmes, I, '40 (D).
Working Foreman, Charlton Woolen Company, Charlton City, Mass.

Regan, Paul William, IV, '37 (B.T.C.).
Assistant Dyer, Crompton-Shenandoah Company, Waynesboro, Va.

Reinhold, Kurt Herman, VI, '28 (B.T.E.).
Director of Priorities and Allocations and Production Control Manager, The Russell Mfg. Co., Middletown, Conn.

Reynolds, Fred Bartlett, II, '08 (D).
Purchasing Agent, M. T. Stevens & Sons Company, North Andover, Mass.

Reynolds, Isabel Halliday, III, '03 (C).
Clerk, Pacific Mills Print Works, Lawrence, Mass.

Reynolds, Raymond, II, '24 (D).
Supervisor, E. I. du Pont de Nemours & Co., Charlestown, Ind.

Rice, Kenneth Earl, VI, '29 (B.T.E.).
With Sidney Blumenthal & Co., Shelton, Conn.

Rich, Charlotte Merline, IV, '41 (B.T.C.). See Michelson, Mrs. Charlotte R.

Rich, Edward, IV, '15 (B.T.D.).

Rich, Everett Blaine, III, '11 (D).
Wolfeboro, N. H.

Rich, Milton Scott, II, '22 (D).
Assistant Purchasing Agent, Harvard University, Cambridge, Mass.

Richardson, George Oliver, IV, '16 (B.T.D.).
Manager, Special Products Division, National Aniline Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York City.

Richardson, Richardson Perry, I, '13 (D).
7 Fairmont Street, Lowell, Mass.

Riggs, Homer Chase, VI, '17 (B.T.E.).
President, Riggs & Lombard, Inc., Lowell, Mass.

Ripley, George Keyes, II, '17 (D).
President, Troy Blanket Mills, Troy, N. H.

Ritchie, Newell Baird, IV, '40 (B.T.C.).
Private, 1st Class, U. S. Army.

Rivers, William Anthony, II, '24 (D).
Manager, Metropolitan Life Insurance Company, Marlboro, Mass.

Roarke, John James, IV, '36 (B.T.C.).

Robbins, Lucy Wiley, VI, '37 (B.T.E.).
See Weinbeck, Mrs. John C.

Robbins, Walter Archibald, VI, '30 (B.T.E.).
Assistant to Plant Engineer, Columbia Mills, Inc., Minetto, N. Y.

Roberson, Pat Howell, I, '05 (C).
Union State Bank, Pell City, Ala.

Roberts, Angus Henry, IV, '41 (B.T.C.).
Second Lieutenant, Chemical Warfare Service, U. S. Army.

Roberts, Carrie Isabel, IIIB, '05 (C).
158 Dartmouth Street, Lowell, Mass.

Roberts, Russell Frederick, VI, '42 (B.T.E.).
Ensign, U. S. Naval Reserve.

- Robillard, Gerald Adelbert, IV, '33 (B.T.C.).**
Salesman and Demonstrator, Canadian Industries, Ltd., Montreal, Que.
- Robinson, Ernest Warren, IV, '08 (D).**
Manager, Line Division, The Shakespeare Company, Kalamazoo, Mich.
- Robinson, John Bailey, II, '42 (D).**
With Robinson Mfg. Co., Oxford, Me.
- Robinson, Russell, VI, '21 (B.T.E.).**
Supervisor, Warwick Mills, West Warwick, R. I.
- Robinson, William Albert, II, '25 (D).**
Shipbuilding, Ipswich, Mass.
- Robinson, William Carleton, III, '03 (C).**
- Robson, Frederick William Charles, IV, '10 (D).**
- Rodalvitz, Francis Rudolph, IV, '28 (B.T.C.).**
Chief Textile Research Chemist, Masury-Young Co., Boston, Mass.
- Rogoff, David, VI, '42 (B.T.E.).**
Aviation Cadet, U. S. Army.
- Roth, Paul, VI, '40 (B.T.E.). (Ed.M., 1941).**
With National Felt Company, Easthampton, Mass.
- Roumas, Zenon Anthony, IV, '42 (B.T.C.).**
U. S. Army.
- Rowntree, Clyde Burton, IV, '39 (B.T.C.).**
Textile Chemist, Pacific Mills, Worsted Division, Lawrence, Mass.
- Royal, Louis Merry, VI, '21 (B.T.E.). (Ed.M., 1941, R. I. College of Education).**
Teacher of Mathematics, East Senior High School, Pawtucket, R. I.
- Rundlett, Arnold Dearborn, VI, '12 (D).**
Superintendent, Joseph Noone's Sons Company, Peterborough, N. H.
- Runnells, Harold Nelson, IV, '25 (B.T.C.).**
Assistant Treasurer, New Hampshire Acceptance Corporation, Concord, N. H.
- Russell, Harold William, VI, '32 (B.T.E.).**
In Charge of Research, Research Laboratory, Goodall Worsted Company, Sanford, Me.
- Russell, John William, IV, '20 (B.T.C.).**
Assistant Treasurer, American Lanolin Corporation, Lawrence, Mass.
- Russell, William Samuel, Jr., VI, '28 (B.T.E.).**
Textile Division Manager, Keasbey & Mattison Co., Ambler, Pa.
- Ryan, David Louis, II, '27 (D).**
District Sales Manager, Duplan Silk Corporation, 18 West Chelton Avenue, Philadelphia, Pa.
- Ryan, Lawrence Francis, IV, '23 (B.T.C.).**
Demonstrator, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- Ryan, Millard Kenneth Thomas, Jr., II, '24 (D).**
With E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- Ryberg, Bertil August, IV, '29 (B.T.C.), '36 (M.S.).**
Associate Director of Research, American Association of Textile Chemists and Colorists, Lowell Textile Institute, Lowell, Mass.
- S**
- Sadler, Thomas Sheridan, II, '30 (D).**
With Carolina Asbestos Company, Davidson, N. C.
- Saltsman, Sidney Irving, IV, '41 (B.T.C.).**
Ensign, U. S. Naval Reserve.
- Sampson, Clifford William, IV, '28 (B.T.C.).**
Sales Manager, Chemical Division, Emery Industries, Inc., Cincinnati, Ohio.
- Sanborn, Frank Morrison, VI, '19 (B.T.E.).**
With Winnsboro Cotton Mills, Winnsboro, S. C.
- Sanborn, Ralph Lyford, VI, '16 (B.T.E.).**
Purchasing Agent, Firestone Cotton Mills, Inc., Gastonia, N. C.
- Sandlund, Carl Seth, VI, '25 (B.T.E.).**
In Charge of Testing, Dyeing & Throwing, Proper-McCallum Hosiery Company, Northampton, Mass.
- Sargent, Robert Edward, IV, '25 (B.T.C.).**
Chemist, Tubize Chatillon Corporation, Rome, Ga.
- Sargent, Walter Ambrose, I, '22 (D).**
Instructor, Textile Shop Practice, Board of Education, Passaic, N. J.
- Saunders, Harold Fairbairn, IV, '09 (D).**
301 West 8th Street, Coffeyville, Kans.
- Savard, Aime Albert, Jr., IV, '33 (B.T.C.).**
Printing Department, United States Finishing Company, Norwich, Conn.
- Savery, James Bryan, II, '23 (D).**
Secretary, Stiles Lubricants, Inc., Hartford, Conn.
- Sawyer, Henry Severance, VI, '32 (B.T.E.).**
President and Treasurer, Sawyer, Regan Company, Dalton, Mass.
- Sawyer, Richard Morey, VI, '27 (B.T.E.). (M.S., 1929, Massachusetts Institute of Technology.)**
Office Manager, Firestone Cotton Mills, Inc., Gastonia, N. C.
- Scanlon, Andrew Augustine, IV, '26 (B.T.C.).**
- Schaetzle, Andre Paul, IV, '21 (B.T.C.).**
Chief Chemist, Aspinook Corporation, Jewett City, Conn.
- Schiffer, Lathrope Adolph, VI, '41 (B.T.E.).**
Production and Design Assistant, Wollman Mills, Inc., New York, N. Y.
- Schneiderman, Jacob, III, '27 (D).**
Golf Professional, Mt. Pleasant Country Club, Leicester, Mass.
- Schoelzel, Herman Walter, IV, '35 (B.T.C.).**
Overseer of Dyeing, Mascoma Mills, Lebanon, N. H.
- Schreiter, Ehrich Ernest Max, VI, '26 (B.T.E.).**
Representative, Sun Oil Company, Revere, Mass.
- Schwarz, Herman Louis, IV, '22 (B.T.C.).**
Textile Chemist, Sandoz Chemical Works, Inc., 61 Van Dam Street, New York City.
- Scott, Gordon Maxwell, IV, '20 (B.T.C.).**
Finisher, Princeton Worsted Mills, Inc., Trenton, N. J.
- Shaber, Hyman Jesse, VI, '17 (B.T.E.). M.B.A., 1922 Harvard Graduate School of Business Administration.**
- Shafter, Stuart Frederic, IV, '42 (B.T.C.).**
Ensign, U. S. Naval Reserve.
- Shah, Kantilal Hiralal, VI, '36 (B.T.E.).**
India.
- Shah, Shantilal Hiralal, IV, '34 (B.T.C.). (M.B.A., 1936, Harvard Graduate School of Business Administration.)**
India.
- Shain, Joseph, IV, '35 (B.T.C.).**
Dyer, Cowan & Shain, Haverhill, Mass.
- Shanahan, James Edward, II, '22 (D).**
Textile Inspector, Quartermaster Depot, U. S. War Department, Philadelphia, Pa.
- Shananquet, Mrs. Lee (Woodies, Ida A.), IIIB, '00 (C).**
- Shann, William Edwin, II, '35 (D).**
Section Hand, English Drawing, Pacific Mills, Lawrence, Mass.
- Shapiro, Jeffrey Jay, VI, '42 (B.T.E.).**
333 West 86th Street, New York, N. Y.
- Shapiro, Sidney, VI, '38 (B.T.E.).**
Salesman, Pierce Lithographic Corp., Lawrence, Mass.
- Shapiro, Simon, VI, '34 (B.T.E.).**
Partner, Lifco Webbing Company, Fall River, Mass.
- Shea, Francis James, II, '12 (D).**
- Shea, John Francis, IV, '28 (B.T.C.).**
N. E. Manager, Becco Sales Corporation, 207 A Street, Boston, Mass.
- Shedd, Jackson Ambrose, III, '28 (D).**
Stylist and Designer, Forstmann Woolen Co., Passaic, N. J.
- Sheehan, Leo James, IV, '38 (B.T.C.).**
Associate Technologist, Quartermaster Depot, U. S. War Department, Jeffersonville, Ind.
- Shelton, Charles Leopold, VI, '29 (B.T.E.).**
Captain, U. S. Army, Chemical Warfare Service.
- Shenker, Nahman, III, '25 (D).**
Senior Textile Inspector, Federal Government, Brooklyn, N. Y.
- Sidebottom, Leon William, IV, '11 (D).**
Chief Chemist, B. B. Chemical Company, Cambridge, Mass.

- Sigel, Mrs. A. E. (Calder, Marian B.), VI, '37 (M.S.).** (B.S. 1934, College of Industrial Arts, Texas State College for Women). Research Assistant, Fabric Research Laboratory, Inc., 665 Boylston Street, Boston, Mass.
- Silberstein, Raymond, III, '39 (D).** Student, Lowell Textile Institute.
- Silverman, Joseph Melvin, VI, '40 (B.T.E.).** Lieutenant, U. S. Army.
- Sinski, Henry Anthony, VI, '41 (B.T.E.).** U. S. Army.
- Sjostrom, Carl Gustaf Verner, Jr., III, '17 (D).** Designer and Assistant Superintendent, Dunn Woolen Co., Martinsburg, W. Va.
- Skalkas, Basil George, IV, '41 (B.T.C.).** U. S. Army, 2nd Chemical Company.
- Skinkle, John Henry, IV, '42 (M.S.).** (B.S., Massachusetts Institute of Technology, 1924). Assistant Professor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.
- Slamin, Alfred Francis, I, '26 (D).** Sales Manager, Benjamin Franklin Paint and Varnish Company, Philadelphia, Pa.
- Sleeper, Robert Reid, IV, '00 (D).** Textile Colorist, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.
- Smith, Allen Batterman, I, '26 (D).** Turner Halsey Company, 40 Worth Street, New York City.
- Smith, Doane White, II, '10 (D).** 15 Oakland Street, Natick, Mass.
- Smith, Francis Dunham, VI, '42 (B.T.E.).** U. S. Army.
- Smith, Frank Kenfield, II, '24 (D).** Superintendent, Grout's, Ltd., St. Catharines, Ont.
- Smith, Harold, IV, '34 (B.T.C.).** Chemist, Quartermaster Depot, Philadelphia, Pa.
- Smith, Herbert Jeffers, VI, '22 (B.T.E.).** U. S. Ring Traveler Company, Providence, R.I.
- Smith, Lawrence, Lt. (SC) U. S. N., VI, '40 (M.S.).** (B.S., U. S. Naval Academy, 1932). Naval Clothing Depot, Brooklyn, N. Y.
- Smith, Ralston Fox, I, '04 (C).** 2600 Norfolk Road, Cleveland Heights, Cleveland, Ohio.
- Smith, Roger Dennis, II, '27 (D).** Assistant Superintendent, M. T. Stevens & Sons Co. (Pentucket Mills), Haverhill, Mass.
- Smith, Theophilus Gilman, Jr., IV, '10 (D).** Farming, Groton, Mass.
- Snelling, Fred Newman, II, '03 (D).** With the American Railway Express Company, Haverhill, Mass.
- Sokolosky, Henry, VI, '17 (B.T.E.).** Production Manager, B. F. Sturtevant Company, Hyde Park, Mass.
- Somers, Benjamin, II, '25 (D).**
- Sood, George David, IV, '38 (B.T.C.).** Technician in Research Department, Slatersville Finishing Company, Slatersville, R. I.
- Southwick, Charles Hudson, IV, '22 (B.T.C.).** Assistant Dyer, Slatersville Finishing Company, Slatersville, R. I.
- Spalding, Arthur Ovilla, IV, '32 (B.T.C.).** Technical Man on Wool and Worsted, Sandoz Chemical Works, Inc., New York City.
- Spanos, James Peter, IV, '37 (B.T.C.).** U. S. Army.
- Spevack, Edward, IV, '39 (B.T.C.).** Cadet, U. S. Army Air Corps.
- Spiegel, Edward, II, '03 (C).**
- Stacey, Alfred Charles, IV, '30 (B.T.C.).** Textile Technologist, Shoe Lace Company, Lawrence, Mass.
- Staklinski, Walter Albert, VI, '42 (B.T.E.).** Junior Process Engineer, U. S. Rubber Co., Milwaukee Ordnance Plant, Milwaukee, Wis.
- Standish, John Carver, IV, '11 (D).** Superintendent, Albany Felt Company, Albany, N. Y.
- Stanley, John Prince, Jr., IV, '29 (B.T.C.).** Assistant Chemist, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
- Stass, John George, II, '27 (D).** Textile Analyst, Better Fabrics Testing Bureau, Inc., 101 West 31st Street, New York City.
- Steadman, Frank M., VI, '39 (M.S.).** (B.S., U. S. Military Academy, 1929). Lieutenant-Colonel, Quartermaster Corps, Research and Development, U. S. Army, Philadelphia, Pa.
- Stearns, Kenneth Lawrence, IV, '33 (B.T.C.).** Dye House, Pacific Print Works, Lawrence, Mass.
- Steele, Everett Vernon, IV, '24 (B.T.C.).** Lieutenant, U. S. N. R.
- Stein, William Joseph, VI, '35 (B.T.E.).** Executive, Milton C. Blum, New York, N. Y.
- Steinberg, Sidney, VI, '39 (B.T.E.).** Corporal, U. S. Army, Q. M. Det., Camp Kilmer.
- Stephens, Arnold George, I, '29 (D).** U. S. Army.
- Stevens, Raymond Russell, IV, '19 (B.T.C.).** Chief Chemist, The Felters Company, Inc., Millbury, Mass.
- Stevens, William Edwin, I, '34 (D).** With B. B. & R. Knight Corporation (Royal Mill), River Point, R. I.
- Stevenson, Murray Reid, III, '03 (C).**
- Stewart, Alexander, VI, '31 (B.T.E.).** Commissioner of Conciliation, U. S. Department of Labor, Washington, D. C.
- Stewart, John Weeden, IV, '30 (B.T.C.).** New England Representative, Aqua Sec. Corp., New York, N. Y.
- Stewart, Walter Lawrence, III, '03 (D).**
- Stiegler, Harold Winfred, IV, '18 (B.T.C.).** (M.S., 1922, Ph.D., 1924, Northwestern University.) Major, U. S. Chemical Warfare Service, Washington, D. C.
- Stohn, Alexander Charles, III, '06 (C).** Factory and Production Manager, Carl Stohn, Inc., East Taunton, Mass.
- Stolzberg, Howard Nathaniel, IV, '35 (B.T.C.).** Chemist and Owner, Jaybee Chemical Company, Haverhill, Mass.
- Stone, Ira Aaron, IV, '09 (D).** Vice-President, Riverside Mills, Augusta, Ga.
- Storer, Francis Everett, II, '07 (D).** Meredith, N. H.
- Storey, Alvin Briggs, VI, '28 (B.T.E.).** Superintendent of Textile Division, Celanese Corporation of America, Cumberland, Md.
- Stott, John Smith, III, '28 (D).** With Newmarket Manufacturing Company, Lowell, Mass.
- Stowell, Eldon, A.B., I, '39 (D).** Ensign, U. S. Coast Guard Reserve.
- Stronach, Irving Nichols, IV, '10 (D).** Superintendent, Hampton Company, Easthampton, Mass.
- Strout, Kenneth Edward, III, '28 (D).** Designer, United Elastic Corp., New Haven, Conn.
- Sturtevant, Albert William, IV, '17 (D).** Foreman, Lowell Motor Sales, Inc., Lowell, Mass.
- Sturtevant, Fred William, IV, '26 (B.T.C.).** Chemist, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.
- Suhle, Waldo Eric, IV, '20 (B.T.C.).** Teacher, Jefferson Junior High School, Meriden, Conn.
- Sullivan, John David, VI, '12 (D).** With Robert Gair Company, Bradford, Mass.
- Sullivan, Lambert William, II, '23 (D).** Boatswain Mate, 1st Class, U. S. Coast Guard, Receiving Station, Boston, Mass.
- Sullivan, Paul John, IV, '41 (B.T.C.).** First Lieutenant, U. S. Army.
- Sullivan, Willard David, II, '23 (D).** Breen's Store, Lowell, Mass.
- Sunbury, Herbert Ellsworth, VI, '18 (B.T.E.).** Asbestos Sales Manager, U. S. Rubber Co., New York, N. Y.
- Sung, Harvey Chih, VI, '37 (B.T.E.).** 7 Min. Yuan Hsi Li, Colombo Road, Tientsin, China.

- Sutcliffe, Henry Mundell, II, '25 (D).**
Assembler, Norton Co., Worcester, Mass.
- Sutton, Leslie Emans, I, '17 (D).**
Manager, Anniston Cordage Company, Anniston, Ala.
- Swain, Harry LeRoy, Jr., I, '26 (D).**
Purchasing Department, Firestone Tire & Rubber Co., Akron, Ohio.
- Swan, Guy Carleton, II, '06 (D).**
Chief Chemist, U. S. Food and Drug Administration, 201 Varick Street, New York City.
- Swanson, John Harold, I, '28 (D).**
Superintendent, Dundee Mills, Inc., Griffin, Ga.
- Sweat, Safford Pershing, IV, '40 (B.T.C.).**
Lieutenant, U. S. Army.
- Sweeney, George Hamilton, II, '24 (D).**
Salesman, Walker Stetson Company, 147 Essex Street, Boston, Mass.
- Swiatek, Bronislaw John, VI, '40 (M.S.). (B.S., Tri-State College, 1938.**
U. S. Army.
- Swift, Rev. Edward Spooner, S. J., I, '02 (D)**
Administrator of Boston College, Chestnut Hill, Mass.
- Syme, James Francis, II, '00 (D).**
Vice-President and Director, Hayward-Schuster Mills, East Douglas, Mass.
- Symmes, Dean Whiting, IV, '22 (B.T.C.).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston, Mass.
- Szopa, Stanley, IV, '42 (B.T.C.).**
Textile Chemist, Pacific Mills, Lawrence, Mass.
- Szymosek, Frank John, IV, '41 (B.T.C.).**
Ensign, U. S. Navy.

T

- Tamulonis, Edward William, VI, '30 (B.T.E.).**
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- Tang, Hsiung-Yuan, I, '30 (D).**
- Tarpey, Thomas Joseph, IV, '27 (B.T.C.).**
23 Fremont Street, Somerville, Mass.
- Tarshis, Elias Aaron, IV, '28 (B.T.C.).**
Treasurer, Silver Line Dye Works, Inc., New York, N. Y.
- Tartikoff, Jordan Alvin, VI, '41 (B.T.E.).**
U. S. Army, A. C. Detachment, Chanute Field, Rantoul, Ill.
- Teague, Charles Baird, II, '26 (D).**
Structural Engineer and Field Expeditor, E. B. Badger & Sons Co., Boston, Mass.
- Thaxter, Joseph Blake, Jr., II, '12 (D).**
Assistant Selling Agent, Ludlow Manufacturing & Sales Corporation, 211 Congress Street, Boston, Mass.
- Thayer, Walter Stephen, VI, '40 (B.T.E.).**
- Thomas, Benjamin, Jr., VI, '34 (B.T.E.).**
Overseer, Rayon Division, Jackson Mills, Nashua, N. H.
- Thomas, Donald Henry, IV, '42 (B.T.C.).**
Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
- Thomas, Henry Edward, VI, '40 (B.T.E.).**
Engineering Draftsman, C. G. Sargent's Sons Corp., Graniteville, Mass.
- Thomas, Robert Joseph, IV, '34 (B.T.C.).**
(M.S., 1937, Ph.D., 1939, University of Notre Dame.)
Research Chemist, E. I. du Pont de Nemours & Company, Inc. Wilmington, Del.
- Thomas, Roland Vincent, I, '05 (C).**
With Chicopee Sales Corporation, 40 Worth Street, New York City.
- Thompson, Arthur Robert, Jr., IV, '22 (B.T.C.).**
Salesman, Ciba Company, Inc., Charlotte, N. C.
- Thompson, Everett Leander, I, '05 (D).**
53 Morse Avenue, Brockton, Mass.
- Thompson, George Robert, IV, '35 (B.T.C.).**
Textile Chemist, United States Finishing Company, Norwich, Conn.
- Todd, Walter Ernest, III, '23 (D).**
Agent, Metropolitan Life Insurance Company, Uxbridge, Mass.
- Toepler, Carl, IV, '22 (B.T.C.).**
Superintendent of Permanent Finish Department, Bellman Brook Bleachery Company, Fairview, N. J.

- Toher, Francis Luke, IV, '32 (B.T.C.).**
In Charge of Dyeing, Lebanon Knitting Mill Company, Pawtucket, R. I.
- Topjian, Leon, IV, '30 (B.T.C.).**
416 Massachusetts Avenue, Boston, Mass.
- Toshach, Reginald Alexander, II, '11 (D).**
Proprietor, Toshach's Mill Remnants, Haverhill, Mass.
- Toupin, Stephane Frederick, VI, '24 (B.T.E.).**
Plant Engineer, Regent Knitting Mills, Ltd., St. Jerome, Quebec.
- True, William Clifford, II, '22 (D).**
Assistant Superintendent, Ludlow Manufacturing & Sales Co., Allentown, Pa.
- Turcotte, David Henry, IV, '33 (B.T.C.).**
33 Ellis Avenue, Lowell, Mass.
- Turner, George Robert, IV, '41 (B.T.C.).**
Textile Chemist and Colorist, E. I. du Pont de Nemours & Co., Wilmington, Del.
- Tyler, Bernard James, IV, '36 (B.T.C.).**
Secretary, Albi Chemical Corp., New York, N. Y.
- Tyler, Lauriston Whitcombe, II, '16 (D).**
Manager, W. T. Grant Company, Brunswick, Me.

U

- Urlaub, George Samuel, IV, '41 (B.T.C.) '42 (M.S.).**
T. N. T. Operator, U. S. Rubber Company, Pennsylvania Ordnance Works, Williamsport Pa.

V

- Valentine, Burnet, VI, '23 (B.T.E.).**
Vice-President, Moraff Craig Co., Inc., and with A. D. Juilliard & Co., Inc., New York, N. Y.
- Valentine, Preston Sumner, IV, '36 (B.T.C.).**
With American Seal-Kap Corporation, Long Island City, N. Y.
- Valvanis, Nicholas John, IV, '40 (M.S.). (B.S., Massachusetts State College, 1939.)**
Textile Chemist, A. M. Tenney Associates, Inc., New York City.
- Vaniotis, Socrates Vasilios, IV, '37 (B.T.C.).**
Textile Colorist, Sidney Blumenthal & Co., Inc., Shelton, Conn.
- Varnum, Arthur Clayton, II, '06 (D).**
U. S. Textile Inspector.
- Villa, Luis Jorge, IV, '25 (B.T.C.).**
With Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia, S. A.
- Villa, William Horace, VI, '24 (B.T.E.).**
Technical Director, Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia, S. A.
- Villeneuve, Maurice Arthur, II, '26 (D).**
U. S. Army.
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18 Albion Street, Hyde Park, Mass.

W

- Wagner, George Frederic, Jr., VI, '38 (B.T.E.).**
Superintendent, Gonie Mfg. Co., Gonie, N. H.
- Walen, Ernest Dean, VI, '14 (B.T.E.).**
Vice-President, Pacific Mills, Worsted Division, Lawrence, Mass.
- Walker, Alfred Schuyler, II, '11 (D).**
67 Park Avenue, Saranac Lake, N. Y.
- Walker, Anna Gertrude, IIb, '03 (C).**
See Pradel, Mrs. Alois J.
- Walker, Raymond Scott, II, '23 (D).**
Production Superintendent, Arlington Mills, Lawrence, Mass.
- Walker, Samuel J., IV, '32 (B.T.C.).**
Analyst, National Association of Dyers and Cleaners, Silver Springs, Md.
- Wallace, Joseph Max, IV, '31 (B.T.C.).**
- Wang, Chen, IV, '23 (B.T.C.).**
- Wang, Cho, VI, '23 (B.T.E.).**
- Wang, Tung Chuan, VI, '23 (B.T.E.).**
- Wang, Yun-Cheng, VI, '31 (B.T.E.).**
Assistant Manager, Sung Sing Cotton Mill No. 1, Shanghai, China.
- Wang, Yung Chi, II, '21 (D).**
- Ward, George Chester, IV, '28 (B.T.C.).**
Research Chemist, Celanese Corporation of America, Cumberland, Md.

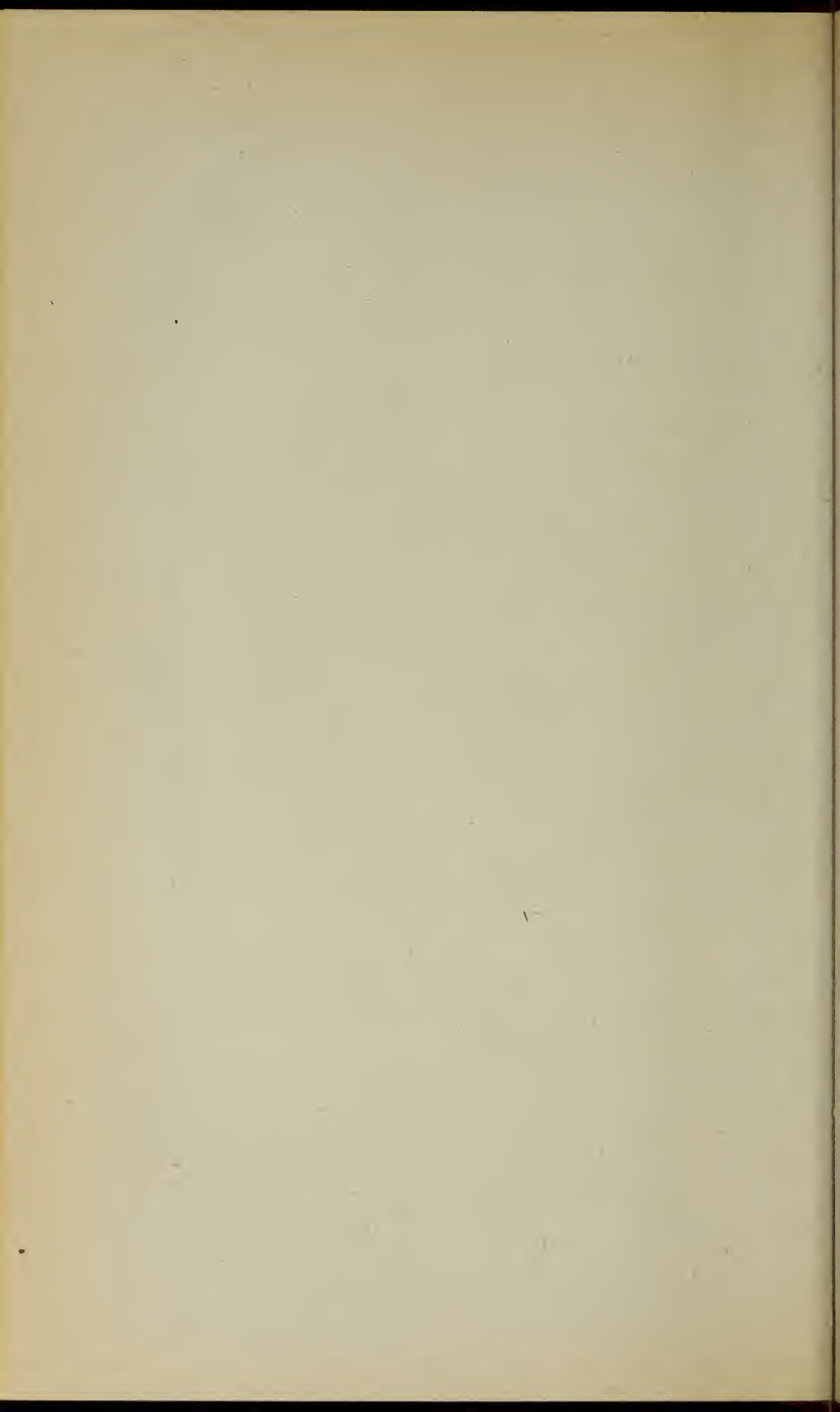
- Warren, E. Maybelle, IV, '28 (B.T.C.).
See McBee, Mrs. Damon F.
- Warren, Philip Hamilton, II, '05 (D).
Superintendent, Hopeville Manufacturing Company, Worcester, Mass.
- Washburn, John Milton, Jr., IV, '21 (B.T.C.).
New England Manager, Emery Industries, Inc., 187 Perry Street, Lowell, Mass.
- Watson, William, III, '11 (D).
Real Estate, Wm. Watson, 50-54 Merrimack Street, Haverhill, Mass.
- Webb, Ralph Peabody, VI, '42 (B.T.E.).
450 Broadway, Dracut, Mass.
- Webber, Arthur Hammond, IV, '01 (D).
Research, B. B. Chemical Co., Cambridge, Mass.
- Webster, Joseph Albert, VI, '23 (B.T.E.).
Production Manager & Raw Material Buyer, Stehli & Co., Inc., New York, N. Y.
- Weil, Clarence Bernard, IV, '41 (B.T.C.).
Chief Chemist, Crompton Company, West Warwick, R. I.
- Weinbeck, Mrs. John C. (Robbins, Lucy W.), VI, '37 (B.T.E.).
Inspector, Lowell Ordnance Plant, Lowell, Mass.
- Weinstein, Edward Joseph, VI, '25 (B.T.E.).
Harrison Hardware Company, Harrison, N. Y.
- Welch, William Paul, Jr., IV, '36 (B.T.C.).
Insurance Agent, Boston Mutual Life Insurance Company, Lowell, Mass.
- Wells, Ai Edwin, VI, '20 (B.T.E.). (Ed.M. 1937, Boston University.)
Assistant Professor, Textile Engineering Department, Lowell Textile Institute, Lowell, Mass.
- Wells, Henry Alfred, Jr., IV, '33 (B.T.C.).
Production Engineering Department, Wright Aeronautical Corporation, Paterson, N. J.
- Westaway, John Chester, VI, '28 (B.T.E.).
Secretary-Treasurer, W. J. Westaway Co., Ltd., Hamilton, Ont., and Vice-President, Sonoco Products Company of Canada, Ltd., Brantford, Ont.
- Westbrooke, Clayton Collington, IV, '29 (B.T.C.).
Chemist, Bigelow-Sanford Carpet Company, Thompsonville, Conn.
- Wetherbee, Francis Putney, I, '28 (D).
Flint River Cotton Mills, Albany, Ga.
- Wheaton, Walter Francis, VI, '23 (B.T.E.).
Buyer, Genung's, Inc., New York City.
- Wheelock, Silas Mandeville, Jr., II, '39 (D).
With Smith & Winchester Company, South Windham, Mass.
- Wheelock, Stanley Herbert, II, '05 (D).
President and Treasurer, Stanley Woolen Company, Uxbridge, Mass.
- Whitcomb, Roscoe Myron, IV, '10 (D).
Pharmacist, R. M. Whitcomb, Ashland, N. H.
- White, Royal Philip, II, '04 (D).
Resident Manager, American Woolen Company, Sawyer Mills, Dover, N. H.
- Whitehill, Warren Hall, IV, '12 (D).
Overseer of Dyeing, Pacific Mills, Worsted Department, Lawrence, Mass.
- Wich, Raymond Edward, IV, '29 (B.T.C.).
Wiesner, Arthur Charles, II, '39 (D).
With Rhode Island Worsted Company, Stafford Springs, Conn.
- Wightman, William Henry, IV, '06 (D).
Technical Salesman, Ciba Company, Inc., Boston, Mass.
- Wilcox, Leonard Edward, VI, '24 (B.T.E.).
179 Varnum Avenue, Lowell, Mass.
- Wilkie, Robert Campbell, VI, '34 (B.T.E.).
Mechanical Research Engineer, Pacific Mills, Worsted Division, Lawrence, Mass.
- Wilkinson, Herbert William, Jr., IV, '37 (B.T.C.).
Technical Director, Southbridge Finishing Company, Southbridge, Mass.
- Wilkinson, Vernon Lee, I, '42 (D).
Student, Lowell Textile Institute.
- Williams, Albert William, III, '32 (D).
Designer, Manhattan Shirt Company, New York, N. Y.
- Williamson, Douglas Franklin, I, '22 (D).
Superintendent, Plant 3, Granite Falls Manufacturing Company, Granite Falls, N. C.
- Wilman, Rodney Bernhardt, II, '25 (D).
Superintendent, New England Fibre Blanket Company, Worcester, Mass.
- Wilson, Raymond Bachman, II, '36 (D).
With International Narrow Fabric Company, Keene, N. H.
- Wing, Charles True, III, '02 (D).
Paymaster, M. T. Stevens & Sons Company, Dracut, Mass.
- Wingate, William Henry, IV, '08 (D).
Instructor, Bradford-Durfee Textile School, Fall River, Mass.
- Winkler, Burton Cole, IV, '39 (B.T.C.).
Dyer, Waverly Piece Dye Works, Elizabeth, N. J.
- Wise, Paul Tower, II, '01 (D).
President, Chelsea Fibre Mills, 1155 Manhattan Avenue, Brooklyn, N. Y.
- Wojas, Stanley Edward, IV, '33 (B.T.C.).
Chemist, Massachusetts Mohair Plush Company, Lowell, Mass.
- Wolf, Irving Jacob, VI, '41 (B.T.E.).
U. S. Army.
- Wolf, Irving Paul, IV, '42 (B.T.C.).
Student, Massachusetts Institute of Technology, Cambridge, Mass.
- Woo, Tsunkwei, VI, '19 (B.T.E.).
- Wood, Ernest Hadley, S.B., IV, '11 (D).
- Wood, James Carleton, IV, '09 (D).
Sales Representative, R. T. Vanderbilt Company, New York City.
- Wood, Lawrence Burnham, IV, '17 (B.T.C.).
Chemist, Arkwright Corporation, Fall River, Mass.
- Woodard, Alice M., VI, '41 (B.T.E.).
See Lane, Mrs. Joseph J., 2nd.
- Woodard, Malcolm Russell, IV, '40 (B.T.C.).
U. S. Army.
- Woodbury, Kenneth Leroy, VI, '28 (B.T.E.).
Designer and Technician, Sidney Blumenthal & Company, Shelton, Conn.
- Woodcock, Eugene Close, II, '07 (D).
Manager, Jute Yarn Department, Ensign Bickford Company, Simsbury, Conn.
- Woodhead, Joseph Arthur, VI, '23 (B.T.E.).
Supervisor, Technical Service Division, Research and Development Department, Colgate-Palmolive-Peet Company, Jersey City, N. J.
- Woodies, Ida Alberta, IIIB, '00 (C).
See Shanauet, Mrs. Lee.
- Woodman, Harry Lincoln, I, '02 (C).
Salvage Foreman, Monsanto Chemical Company, Merrimack Division, Everett, Mass.
- Wormwood, Herbert Alvin, IV, '36 (B.T.C.).
Textile Chemist, Watson-Park Company, Ballardvale, Mass.
- Worthen, Clifford Tasker, IV, '22 (B.T.C.).
Dyer, F. C. Huyck & Sons, Kenwood Mills, Albany, N. Y.
- Wortkowitz, Michael Joseph, VI, '20 (B.T.E.).
- Wright, Edward, II, '05 (C).
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- Wright, George Ward, IV, '38 (B.T.C.).
Chemist, Gustavus T. Esselin, Inc., 857 Boylston Street, Boston, Mass.
- Wu, Clarence Wen-Lon, VI, '25 (B.T.E.).
- Wu, Tsung-Chieh, VI, '25 (B.T.E.).
- Wynn, William Joseph, Jr., IV, '34 (B.T.C.).
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Y

- Yacubian, Gamaliel Mardiros, II, '40 (D).
U. S. Navy.
- Yavner, Harry, II, '12 (D).
Merchant, Mayo's Hardware Company, Jamaica Plain, Mass.
- Young, Edmund Joseph, Jr., IV, '33 (B.T.C.).
U. S. Inspector (Powder & Explosives), War Department, Boston, Mass.
- Yung, E-Zung, I, '32 (D).

Z

- Zalkind, Benjamin Joseph, VI, '29 (B.T.E.).
Textile Engineer, Saco-Lowell Shops, Biddeford, Me.
- Zellweger, Ralph John, VI, '41 (B.T.E.).
Ensign, U. S. Navy.
- Ziack, LeRoy, II, '25 (D).
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- Zisman, Louis Samuel, IV, '20 (B.T.C.).
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Moody Street and Colonial Avenue

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LOWELL EVENING TEXTILE SCHOOL

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FOR TERM ENDING JUNE 30, 1944

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FOR TERM ENDING JUNE 30, 1945

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ROLAND E. DERBY, Lawrence, Proprietor, The Derby Company
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Instructor in Chemistry and Dyeing Department.	
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WALTER LISIEN	85 Whipple Street.
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DONALD CHESTER ROBERTS	Chelmsford
Student Instructor in Cotton Department.	
WILLIAM JAMES SIDEBOTTOM	548 Fletcher Street
Student Instructor in Chemistry and Dyeing Department.	
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Evening Instructor in Machine Shop.	
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Evening Instructor in Art.	
HAROLD R. ANDERSON	95 High Street, Chelmsford.
Evening Instructor in Worsted Yarns.	
FRANCIS L. DACEY	465 Andover Street.
Evening Instructor in Geometry.	
FRANCIS T. O'HEARN	19 Princeton Boulevard.
Evening Instructor in Mathematics.	
JOHN H. FLOOD	238 Butman Road.
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ELLA R. COBURN	1327 Bridge Street, Dracut.
Evening Instructor in Pattern Alteration.	
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JAMES L. MARSHALL	76 Sayles Street.
Evening Instructor in Textile Design.	

CALENDAR—1943

September 23, Thursday	Registration
September 30, Thursday	Registration
October 4, Monday	Opening of evening school
October 12, Tuesday	Columbus Day—Holiday
November 11, Thursday	Armistice Day—Holiday
November 25-26, Thursday and Friday	Thanksgiving Recess. No classes
December 17, Friday	End of first term

1944

January 3, Monday	Opening of second term
March 3, Friday	Closing of evening school
April 4, Tuesday	Graduation

GENERAL INFORMATION

Entrance Requirements

All applicants to the evening classes must understand the English language and simple arithmetic. Those who are graduates of a grammar or high school are admitted upon certificate. Those who cannot present such a certificate are required to take examination in the subjects of English and arithmetic. In the examination in English a short composition must be written on a given theme, and a certain amount must be written from dictation. In the examination in arithmetic the applicant must show suitable proficiency in addition, subtraction, multiplication, division, common and decimal fractions, percentage, ratio and proportion. Opportunity to register or to take these examinations is offered each year, generally on the Thursday evenings of the two weeks previous to the opening of the evening school.

Registration

Before entering the class a student must fill out an attendance card, which can be obtained at the office or from the instructors in the various departments.

Any student who has filed an attendance card and who wishes to change his course must notify the office before making the change.

Sessions

The evening classes commence the first Monday of October and continue for twenty weeks. The school is open on four evenings each week during the period mentioned, except when the school is closed for holiday recesses.

Supplies

Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Students' supplies will be sold from the co-operative store every evening school night from 6.45 to 8.15 P.M.

Fees and Deposits

All evening courses are free to residents of Lowell, but students must file a certificate of residence signed and sealed by the city clerk of Lowell. Those who do not file such certificate will be considered non-residents.

To non-residents of Lowell the fee is \$10 per year for *each course of two nights per week*. Students taking two courses or attending courses requiring more than two nights per week are required to pay \$15 per year for three nights and \$20 for four nights.

All fees and deposits must be paid in advance.

All students, whether from Lowell or not, taking Course 411, Chemistry and Dyeing Department, are required to make a deposit at the commencement of the course—\$5 for first-year students, and \$10 for second-year students. A deposit of \$10 will be required of all students taking Course 412, 413 or 414. This is to cover the cost of laboratory breakages, chemicals, apparatus, etc., and at the end of the year any unexpended balance is returned, or an extra charge made for the excess breakage.

All students taking Machine-Shop Practice will be required to make a deposit of \$5. Any unexpended balance remaining at the end of the year will be returned to the student.

Report of Standing

A report of standing covering the year's work is sent to all students who attend the entire year and take the necessary examinations.

Certificates

The courses of the evening school are varied and arranged to meet the special needs of those engaged in the industry. They vary in length from one to four years, and at the completion of each course the certificate of the school is awarded, provided, however, that the student has been in attendance in the course during the year for which the certificate is granted.

GENERAL EVENING COURSES

The object of these courses is to give young men of ambition an opportunity to obtain instruction in all the branches of science that are allied with their daily work. For example, one who is employed as a weaver in a textile mill may obtain knowledge of the manufacture of yarn, the production of a design, and the methods of finishing a fabric, as well as the manner of its weaving or knitting. In like manner the dyer may augment his knowledge of the chemicals and materials he is daily handling. The engineer and machinist may acquire a knowledge of the mathematics, science of mechanics, electricity and drawing that underlie all the work of an engineer.

It is recognized that the interests of such students lie in a particular field of industry, and these courses are designed to bear directly upon the special line, and supplement, as far as possible, the practical work in which the student is engaged during the day.

In a word, any man having a common school education and the ambition to advance in his line may now secure a broad and comprehensive training in the subjects which will be of vital importance to him in obtaining the goal of his ideal.

A description of all courses follows.

COTTON DEPARTMENT

The courses offered in the Cotton Department are intended for those interested in cotton yarn manufacture and sales. In addition to the value for those directly connected with the carding and spinning departments, the courses offer an opportunity for students who are working in the mill office or the selling office. Men selling supplies to cotton mills will find in these courses an opportunity to become acquainted with the business and its problems which will make possible a more complete service to their customers.

111. Cotton Yarns—2 Years

The *first year* work in cotton yarn manufacture includes a study of cotton and its preparation for market, followed by a study of opening, picking, carding and combing. This work consists of lectures on these operations combined with problems that are peculiar to each operation such as the drafts used, the production of each process and the amounts of waste made. Special consideration is given to the adjustment and care of these machines and some laboratory demonstration is used to show the manner of adjusting machines for the purpose of controlling the weight of the product, the amount of work done in a day and the amount of waste made.

Two evenings each week.

COTTON.—This course starts with a study of cotton growing, the areas producing cotton and the characteristics of cottons from the various producing areas. The effects of seed selection, cultivation, and weather conditions on the cotton are emphasized.

Picking and ginning of cotton are studied to show the importance of proper preparation of lint for mill consumption.

There is a general survey of the intricate cotton marketing system, illustrating the methods of specifying cotton desired and securing delivery at a known price.

OPENING AND PICKING.—As this equipment has changed considerably in recent years, special notes are used illustrating modern machinery and its arrangement. Machine parts, construction and adjustment, are discussed in the classroom and demonstrated in the laboratory. Mixing of cottons for colored work or for price control is considered under these processes.

CARDING.—The process of carding is considered one of the most important, and proper time is devoted to the construction and operation of cards that the student may be familiar with the various parts of the card and the function and design of each. The construction and application of card clothing, and the methods of grinding form a part of the work. Some time is given to a discussion of the waste made in carding, the regulation of the amounts of each made and the calculation of the percentages. New and special attachments for various purposes are brought to the attention of the class, illustrating possible ways of improving carding conditions.

COMBING.—The preparation of card sliver for combing by means of the sliver lapper and ribbon lapper is thoroughly considered. The combing operation itself is studied in considerable detail, emphasizing the general object and operations in

combing and the specific means employed by various types of combs in performing the operations. The calculations in this connection involve the drafts and doublings necessary to produce the proper lap for the comb, the proper comb drafts, and the determination of the per cent of noil produced.

The *second year* work in cotton yarn manufacture includes a study of the operations of drawing, roving, spinning, winding and twisting. The work consists largely of lectures and problems with some laboratory demonstrations to make the student familiar with the machines and the points of adjustment.

Two evenings each week.

DRAWING.—The instruction on drawing introduces the principles of roller draft and the theory of doublings. Special attention is given to roll covering materials and their application. The measurement of uniformity of slivers by various methods is considered here.

ROVING.—Roving includes the various machines known as the slubber, intermediate, fine and jack fly frames. Each of the various motions of these complicated machines is treated separately and then the group is taken as a unit, tying each operation in with the others. Particular attention is paid to the subjects of lay and tension because of their importance in producing perfect roving. The calculations in this subject involve draft, twist, lay and tension with particular attention to the derivation of constants and their use. The new systems of long draft for roving frames are included in this work.

RING SPINNING.—A study of the various types of yarns gives the student an appreciation of the necessary characteristics for various purposes and how these may be obtained. Standard draft and long draft systems are studied in detail. Important machine parts, such as guides, travelers, rings and builders, their adjustment and care, form an important part of this subject. Yarn faults and defects are shown and their causes explained.

SPOOLING AND WINDING.—The discussions under this head cover the treatment of single yarns in preparation for twisting, comparing the relative merits of spooling with multiple winding on tubes, and beaming for special twistors. Winders are also considered as a means of preparing yarn packages for sale yarns.

TWISTING.—Because of the similarity to ring spinning, the emphasis here is more on the manufacturing part of the work, although there are a few peculiar features of a mechanical nature. The twisting of various regular ply yarns, the making of numerous fancy yarns and the principles underlying the production of various patterns are taken up. The use of special twisters and other apparatus for cords and ropes is considered under this heading.

113. Knitting—1 Year

This is a general course on the manufacture of knitted fabrics and garments, intended for those interested in the principles of knitting and a study of the mechanisms of a variety of knitting machines. The more important phases of the course are:—

YARNS AND YARN SIZING SYSTEMS.—In order that the student may understand the distinctions between yarns, terminology, and the various sizing systems commonly used, several lectures are devoted to yarn characteristics and sizing as a basis for the entire course. This covers cottons, woolens, worsteds, silks and rayons.

FLAT MACHINES.—These relatively simple machines make a fine starting point in establishing clearly the action of the latch needle and how it is operated. Lamb, Dubied, Grosser, and Links and Links machines are used as a basis for this part of the work.

SMALL CIRCULAR RIBBERS.—These machines are a very logical step, following flat machines. Brinton, Wildman, and Universal ribbers, with different pattern mechanisms, are used in illustrating this type of work.

AUTOMATIC HOSIERY MACHINES.—This section of the course is built around the various Banner and the Scott and Williams half and full hose machines. Most of the work is done with the plain machines as there is not sufficient time to include the fancy pattern type.

LARGE RIBBERS AND SPRING NEEDLE MACHINES.—Underwear fabric and webbing are produced on this type of equipment. Scott and Williams, Wildman, Tompkins and Crane machines are the basis for instruction along these lines.

FULL FASHIONED MACHINE.—A brief study of the full fashioned principles and actions is based on the Reading 18-section machine in the laboratory.

WARP KNITTING.—Using the Raschel machine in the laboratory, a general study of warp knitting includes Tricot and Milanese work also.

ANALYSIS.—During the study of the various machines, considerable attention is given to the many "stitches" possible. This, coupled with the lectures on fabric and hosiery analysis, covers the common analysis problems.

ROUTINES.—The usual sequence of manufacturing processes for hosiery and underwear are studied with the idea of illustrating the steps necessary in producing different articles.

Most of the instruction in this course is given by lectures. As many of these machines are small, it is common practice to bring the machine under discussion into the classroom so that students may see the machine and parts being considered. In other instances, the class may go into the laboratory to see the equipment and its operation.

114. Cotton Organization—1 Year

This course, offered only to those who have completed the work in Carding and Spinning, is a study of the common arrangements of drafts, sizes and production details for manufacturing various cotton yarns. Illustrative problems demonstrate how to provide for "balancing" a mill or how to divide equipment to produce different yarns in given quantities.

Some time is devoted to discussing various common machinery layouts and the number of operatives required for certain manufacturing arrangements. Typical mill job analysis problems involving time study and end breakage tests are considered.

Two evenings each week.

WOOLEN AND WORSTED DEPARTMENT

211. Woolen Yarns—1 Year

Instruction consists of lectures covering all details of woolen yarn manufacture. This covers all the operations in detail necessary to manufacture yarns from raw stock on the woolen principle, and includes lectures and laboratory work on burr picking, wool blending, mixing, picking, wool oils and emulsions, carding, spinning on both mule and ring frame, and plain and novelty twisting.

Reworked fiber and wool waste is covered in detail from rag sorting to finished staple.

Two evenings each week.

217. Wool and Top Making—1 Year

Instruction consists of lectures in technology of wool fibers and worsted carding and combing.

RAW MATERIALS.—The study of raw materials which enter into the manufacture of woolen or worsted yarns or hardened felts, or are made into yarns by processes similar to those employed in the manufacture of woolen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel hair, cut staple rayon, etc. In connection with these are considered shoddy, noils, and extracts.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lectures. The various characteristics and properties are explained, as are also trade terms, such as Fine, $\frac{1}{2}$ -blood, $\frac{3}{4}$ -blood, 56^s, 36^s, B super, delaine, braid, etc. Over 1,500 samples of wool and other fibers gathered from all the countries of the world are catalogued and are available for inspection and study. Wool shrinkages are studied as are also spinning qualities. A complete collection of literature pertaining to sheep, wool, etc. is available for outside reading or study.

WOOL SCOURING.—The objects of scouring or degreasing and the methods employed are explained. This involves the consideration of soaps and chemicals used in scouring and degreasing, also the waste products and their utilization. A sorted lot of grease wool is scoured by machines that are made similar in operation to regular commercial wool scouring machines. At the same time the use of driers, their operation and regulation, is taken up.

CARBONIZING.—The methods of carbonizing wool, noils, burr waste, rags, etc. are studied. If time permits, a commercial quantity of stock is carbonized on the regulation carbonizing machines in the wool laboratory.

CARDING.—The different types of worsted cards are studied in detail, as well as the construction, setting and operation of cards. A part of this work consists of a study of card clothing, its construction, application, grinding, setting, etc.

COMBING.—This branch takes up the preparing processes, backwashing, also gilling of the stock before and after combing. The construction of the gill boxes and Noble comb is studied by lectures. Two Noble combs are available for inspection and study.

The French comb is studied, and the various calculations to determine draft, noiling, productions, etc., are made.

Two evenings each week.

218. Worsted Yarns—1 Year

Instruction is devoted to detail study of the English and French systems of worsted yarn manufacture.

DRAWING AND SPINNING.—The equipment in the laboratory offers opportunity to make worsted yarn by either the Bradford or open drawing system or by the French system. The process includes the various machines in the successive steps of making Bradford spun yarn, and the functions of the different machines are studied. In the latter, or French system, the stock is run through the drawing machines, and the roving spun into yarn on the worsted mule or frame. The same method of studying the mechanism and operations of these machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

With the instruction in spinning by the Bradford system is given work on the twistors and the effects that may be produced.

Three evenings each week.

TEXTILE DESIGN AND WEAVING DEPARTMENT

311. Cotton Design—3 Years

During the *first year* instruction is given in elementary designing, starting with all the foundation weaves which may be used in fabrics such as the plain weave, rib weaves, basket weaves, twill weaves, satin weaves, granite weaves, etc. Combination and derivative weaves are made up from the aforesaid weaves. Fancy and figured weaves, in most cases originated by the student, are produced. Color effects, which are so essential in fabrics, obtainable from the different weaves, as stated above, in which the color arrangement of warp and filling create the pattern, are thoroughly considered. Not only the designing, but also harness drafting and the making of dobby chains for all type of weave is taken up.

Cloth analysis is considered in conjunction with designing, as a designer must know the kind of fabric he is designing, what material and what size of yarns are to be used, and how heavy and costly the cloth is to be. The various topics discussed are the sizes or counts of yarns made from all kinds of fibers, such as cotton, woolen, worsted, silk, rayon, jute and yarns of other vegetable fibers. Their relative length to the pound is determined in the single two or more ply, mixed yarns, novelty yarns and fancy yarns, in the American or English system. The same is given in the metric system. Problems involving the take-up of yarns in the weaving and finishing process are given. Samples of cloth are picked apart to determine their weaves and general construction.

Two evenings each week.

In the *second year* cloth analysis and design are combined in lecture and practice, starting with plain and leading into the more fancy cotton dobby fabrics. A great variety of samples of cloth are used in class work to determine ends and picks per inch, shrinkage in warp and filling, and the number of reed and reed widths necessary for eventual reconstruction. The yarn numbers of warp and filling are determined by aid of fine balances. The amount of warp and filling necessary for a piece of

goods is calculated and the weight of a whole piece as well as the number of yards per pound are determined.

Two evenings each week.

In the *third year* more elaborate cloths are considered, both in designing and analysis, cloths in which extra warp or extra filling, or both, are used. Warp backed, filling backed, double, triple or more plied fabrics are taken up, such as marseilles, quilting, pique, suspenders, narrow webbings, velveteens, fancy velveteens, velvets, corduroys, Bedford cords, plushes, leno, in fact, anything a student may suggest which might help him in his work.

Two evenings each week.

312. Woolen and Worsted Design—3 Years

This course covers the design and analysis of standard woolen and worsted fabrics and is intended for those who wish to specialize in this branch of textile fabric manufacture. Special and fancy fabrics are studied to the extent that time will permit.

During the *first year* instruction is given in the subject of classification of fabrics, use of points or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks and stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

The analysis of samples is taken up in a systematic manner, illustrating the various cloth constructions for the purpose of determining the design of the weaves and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric.

Two evenings each week.

During the *second year* instruction is given in cotton warp goods, blankets, bath robes, filling reversible, extra warp and filling backs, figured effects produced by extra warp and filling, double cloths and plaid backs.

The analysis work follows as closely as possible the type of fabrics taken up in the designing and the reconstruction of these fabrics with the consideration of their shrinkage and composition.

Two evenings each week.

In the *third year* instruction is given in multiple fabrics, chinchilla, Bedford cords, crepon, matelasse and imitations, double plains, meltons, kersey, plush and suitings. At this time also is taken up the construction of designers' blankets, suggestion cards, and the construction of samples.

The construction of new fabrics from theoretical viewpoint together with the construction from suggestion cards is taken up. In connection with this work instruction is given in making cost estimates for both woolen and worsted fabrics.

Two evenings each week.

313. Decorative Art—3 Years

During the first ten weeks the work consists of charcoal drawing from plaster models and group arrangements of still life. The second ten weeks deals with pastel drawing of still life groups, depending upon the progress and interest of the students.

Two evenings each week.

During the second year instruction is given in figure drawing from the model.

Two evenings each week.

In the third year the student chooses one of the following options:

1. Color Harmony—its mixes and uses.
2. Perspective—a mechanical method of correct drawing.

Two evenings each week.

314. Show Card Design—2 Years

LETTERING.—During the *first year* the student is taught to master the drawing,

with pencil, of a few very plain alphabets, both upper and lower case letters, also plain figures. With the characteristics of plain letter alphabets well in mind, it is but a few steps to make any of the more intricate ones. Following this he will make simple "lay-outs" of plain card signs, and then take up the lettering, with brush and paint, of some of his simple card designs.

Two evenings each week.

The second year is simply a continuation of the latter part of the first year work, with the addition of advanced design in the "lay-out" and color-scheme of practical show cards and posters, such as are designed and lettered in the up-to-date Show Card Shop of to-day.

Two evenings each week.

316. Pattern Alteration—1 Year

This includes a general understanding of the alteration of the commercial pattern as well as alterations for the student's own figure problems.

Two evenings each week.

321. Cotton Weaving—1 Year

The Course in Cotton Weaving covers instruction on plain looms, Draper Automatic and Stafford Automatic looms. It includes instruction on the construction of shedding and picking motions, take-up and let-off motions together with the operation of the magazines and hoppers and methods of changing shuttle and bobbin. A study is also made of the preparation of warps, beaming, sizing and drawing-in. The Crompton and Knowles Automatic Towel Looms, and the various types of box looms, including chain building and work on multipliers, are also considered in this course.

Two evenings each week.

322. Woolen and Worsted Weaving—1 Year.

This course includes instruction on the Crompton and Knowles loom and takes up general construction, head motions, take-up, let-off, filling stop motion, etc. The preparation of warps, wet and dry dressing, is given in connection with this course.

Two evenings each week.

324. Loom Fixing—1 Year

The course in Loom Fixing takes up the timing of all the different motions in the loom, such as the shedding, picking, and adjustment of the shuttle boxes on the 4 x 4 Crompton & Knowles and Draper box and automatic looms, and the setting for the Baker shuttle changing mechanism.

In addition there are many trouble hints given and the various remedies for improper setting. Box chain and harness chain planning and building is also taken up.

Two evenings each week.

CHEMISTRY AND DYEING DEPARTMENT

Hardly any branch of applied science plays so important a part in our industrial world as chemistry. Many large mills employ chemists as well as dyers, and with the great progress which is being made in the manufacture and application of dye-stuffs, a basic knowledge of chemistry becomes an absolute necessity to the dyer. Within a comparatively short distance from Lowell are establishments employing men who require some knowledge of chemistry but who may not necessarily use dyes. Some find a knowledge of analytical chemistry helpful in their everyday work.

To meet these varying needs of our industrial community, the school offers a two-year course in general chemistry, organic and inorganic, which may be followed by any one of three courses, viz., textile chemistry and dyeing, analytical chemistry, and textile and analytical chemistry. In order to take Course 412, 413 or 414, candidates must have a certificate from Course 411, or show by examination or approved credentials that they have taken the equivalent of the work covered by this course.

411. Elementary Chemistry—2 Years

General Chemistry, including Inorganic and Organic.
Qualitative Analysis.

One lecture and one Laboratory Period per week in General Chemistry the first year, continued three nights a week during the second year, when the Elementary Organic Chemistry and Qualitative Analysis is completed.

Instruction in Elementary Chemistry extends through two years, and includes lectures, recitations and a large amount of individual laboratory work upon the following subjects:—

THEORETICAL CHEMISTRY.—Chemical action, chemical combination, combining weights, atomic weights, chemical equations, acids, bases, salts, Avogadro's law, molecular weights, formulæ valence, periodic law, etc.

NON-METALLIC ELEMENTS.—Study of their occurrence, properties, preparation, chemical compounds, etc.

METALLIC ELEMENTS.—Study of their occurrence, properties, metallurgy, chemical compounds, etc.

The students take up, as thoroughly as time will permit, the qualitative detection of the more common metals and non-metals, with practical work.

This work, although necessarily elementary, is intended to prepare the student to study more understandingly the manufacture of dyestuffs and coal tar colors in the more advanced courses which follow.

During the *first year* of the Elementary Chemistry course most of the time is devoted to the non-metals and theoretical chemistry, and the laboratory work covers briefly the non-metals.

Two evenings each week.

During the *second year* the classroom work is upon metals and the hydrocarbons and their derivatives, and the laboratory work consists entirely of Qualitative Analysis. While this course is necessarily taken up in an abbreviated and elementary manner, it is so arranged that the students may become familiar with the separations and the detections of the common metals and acids. This course is also preliminary to the work given in Analytical Chemistry.

Three evenings each week.

412. Textile Chemistry and Dyeing—3 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Dyeing.

Covered by 60 lectures and two nights of laboratory work per week.

The outline of the lecture course given in Textile Chemistry and Dyeing is as follows:—

TECHNOLOGY OF VEGETABLE FIBERS.—Cotton, linen, jute, hemp, china grass. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ANIMAL FIBERS.—Wool, mohair, silk. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ARTIFICIAL FIBERS.—Study of the various forms of artificial silk, the process of manufacture, their properties and action with chemicals, acids and heat.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching, action of soap.

The bleaching of cotton is studied with description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is included a study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods of degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods of detection, their effect during the different operations of bleaching, scouring, dyeing and printing, and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING, AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds not dyestuffs that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting principles and leveling agents.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, tumeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used in recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown, iron buff.

ARTIFICIAL COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and systematic experiments the student learns the nature of the various dyestuffs and mordants, their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool and silk, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye baths, etc.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines.

413. Analytical Chemistry—3 Years

Laboratory Work and Lectures in Quantitative Analysis.

Three nights each week of class-room and laboratory work.

The object of this course is to give the student a general idea of the underlying principles of Analytical Chemistry, with a sufficient amount of laboratory work to enable him to become proficient in performing the ordinary routine analysis of the textile plant. Frequent recitations are held for the discussion of methods and the solution of stoichiometrical problems.

The work covered the first two years is based on Smith's "Quantitative Analysis," and for the advanced work, consists of the analysis of soap, water, oils, coal and other materials of particular interest to the textile chemist. Special lecture notes are given and Griffin's "Technical Methods of Analysis" is used as a text.

414. Textile and Analytical Chemistry—4 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Analytical Chemistry.

Combines all lectures in Textile Chemistry and Dyeing with work of Course 413, but does not include any Dyeing Laboratory.

Three evenings each week.

415. Chemistry and Technology of Leather—1 Year

Requirements: Two years of evening elementary chemistry and two years of inorganic quantitative analysis. A student without this preparative background or its equivalent will not be admitted to this course.

This is a one year course and treats of the chemistry and technology of leather manufacture. All the tannery processes are taken up with special emphasis on the purpose of each operation. In respect to the chemistry involved a short introduction to the chemistry of proteins and fats and the action of enzymes is presented, and the usual analytical methods are considered. Throughout the course mention is made of recent developments and fields of research.

The early part of the course consists entirely of lectures (three one-hour periods). The latter part consists of one weekly lecture and a two-hour laboratory session.
Two evenings each week.

ENGLISH DEPARTMENT

511. English Composition—2 Years

First Year.—**REMEDIAL ENGLISH AND RHETORIC.**—In order to write well it is necessary to have a thorough understanding of grammar. Moreover, it is a great satisfaction to know why you are correct in speaking and writing in a certain way. This course is designed to give a comprehensive survey of necessary grammatical and rhetorical principles. The course of instruction consists of lectures, recitations, remedial exercises, and the study of a text book.

One evening each week.

Second Year.—**THE PRINCIPLES OF COMPOSITION.**—This is an advanced course and is not open to students who have not completed the first year or its equivalent. The primary purpose of this course is to give the student the ability to write clearly and correctly. An intensive study is made of the four divisions of composition—narration, description, exposition, and argumentation—and the art of letter writing. Selections from various authors to be read for general interest and for the purpose of illustration, are assigned for outside reading. Lectures are given; and home work, the study of a text book, and examinations are required.

One evening each week

512. Appreciation of Literature—1 Year

This subject is offered for those who wish to enlarge their cultural background and to study the principles of literary appreciation and criticism. Altho there will be emphasis upon literary technique, the constant aim will be to keep this subordinate to the spirit and the message of the selection.

The prose and the poetry studied will be treated analytically, with directed investigation of the various literary appeals—the intellectual, the sensory, the emotional, the aesthetic, the imaginative, and the philosophical. Emphasis will also be placed upon the value of an extensive reading program. (This course will not be given if the registration is less than twenty-five.)

One evening each week.

TEXTILE ENGINEERING DEPARTMENT

This department has arranged to offer those courses of study which lie at the foundation of all engineering. These are designed to give to those engaged in the mechanical, electrical, and manufacturing departments of mills, factories and other industrial establishments an opportunity to learn something concerning the theory underlying the many practical methods which they use in their daily work. Those subjects for which there is usually a regular demand are listed and described below, but similar and allied courses will also be arranged for provided there is a sufficient demand. In the case of all courses there must be an enrollment of at least ten properly qualified students to warrant giving the subject.

613. Mechanical Drawing—3 Years

This course is a complete course in drawing and is offered for one having occasion to make a sketch or detail drawing for the purposes of illustration or instruction, or for one who is daily required to work from a drawing or blueprint. It first lays a foundation of the principles of mechanical drawing, and follows this with two years' work in drawing directly from parts of machines, preparing both the detail and the assembly drawing.

The work is so planned that at its completion a man shall be thoroughly familiar with the making of a working or shop drawing. After a study of the underlying principles of projections and instruction in penciling, inking, lettering and tracing, the subject of sketching and the making of detail drawings therefrom is especially stressed. The preparation of assembly drawings is finally considered.

Two evenings per week.

614. Machine Shop Practice—2 Years

This course offers an opportunity to learn the art of metal working and is equally valuable to the man who already has some knowledge of the methods employed as

to one who has no knowledge of the same. Thus it becomes possible for one who may be working at the bench during the day to learn how to operate a lathe or other machine tool, or for a lathe hand to acquire a knowledge of a planer, shaper, milling machine, or grinder. A series of lectures is given on the care and management of tools, tool grinding, and the mechanism of the machines. A man who only has a knowledge of the special machine he operates may by means of this course become a more intelligent machinist. He should supplement this study with the courses in Mechanical Drawing, Shop Mathematics, Mechanics, and Mechanism, in order that his training for an all-round machinist or mechanic may be more complete.

Two evenings each week.

619. Mechanics—1 Year

This is one of the most important of engineering subjects. Its principles are so fundamental and so widely used in more advanced subjects that the student should not consider himself qualified for further work until he has mastered the principles of this subject.

Beginning with a discussion of such important topics as work, power, horsepower, energy and the like, the student then studies the fundamental mechanical principles which are exemplified by the lever, jackscrew, pulley block, inclined plane, wedge, differential pulley and other similar devices. This is followed by consideration of the simpler relations pertaining to uniform and accelerated motion. No student should undertake this course who is not thoroughly familiar with elementary mathematics. This subject requires home problem work and the study of a text book.

Two evenings each week.

620. Mathematics—2 Years

This course is designed to permit the student to pursue further the mathematics of his grammar or junior high school course, and should be taken by all who intend to study further into engineering subjects. The first year work in algebra includes addition, subtraction, multiplication, division, factoring and fractions. Some of the topics treated during the second year are graphical representation, linear equations, radicals, quadratic equations, logarithms, slide rule and trigonometry. Instruction is largely through problem work in class and at home and requires the use of a text book.

Two evenings each week.

621. Strength of Materials—1 Year

This interesting subject deals with those important principles whereby the person engaged in machine, engine, mill or building design may ascertain whether the parts are strong enough to carry the forces and loads which the nature of the construction imposes upon them.

The fundamental stresses of tension, compression and shear are first considered, together with the ultimate strength of cast iron, wrought iron, steel, and timber. The practical use of this information is illustrated in the design of bolts, tie rods, columns, wall piers, boiler shells, riveted joints, etc. This is followed by a study of the stresses in and design of beams under various conditions of loading, and the course concludes with a discussion of the torsional stresses and twist in shafts. A knowledge of the principles of Mechanics and Mechanism is highly desirable to a satisfactory understanding of this subject. The method of instruction is through lectures, recitations, problems, and the use of a text book.

Two evenings each week.

622. Steam—1 Year

It is the purpose of this course to study the various methods of heat generation, transmission, and utilization in use at the present day and to learn the theoretical relationship which underlie these processes and transformations.

The instruction covers, so far as time permits, the elements of steam engineering. The topics covered are heat and its measurement, use of steam tables, types of boilers, engines and turbines, boiler and engine room accessories, together with a study of the methods of testing the various types of apparatus. Actual tests on such equipment are made as the size of the class permits. Text books, laboratory and class work, and home problems are the methods of instruction used.

Two evenings each week.

625. Power Plant Machinery—1 Year

The purpose of this course is to teach the operating engineer how to test the various units usually found in a power plant. Numerical calculations are introduced and the interpretation of the results is of primary importance.

The following are some of the machines tested: engine, turbine, triplex pump, centrifugal pump, injector, etc. Various gages are also calibrated. A text book is required.

Two evenings each week.

626. Mill Illumination—1 Year

Safety and production, factors entering into the design of lighting installations, industrial codes, costs and estimates are carefully considered. The laboratory exercises include the study of photometric curves of industrial units, study and use of the photometer, study of illumination by means of the Macbeth Illuminometer, and foot-candle meter.

The concluding work will be the complete design of a lighting installation, using the Institute laboratories or a local mill room.

Owing to limitations in apparatus, this course is open to a limited number of qualified men.

Two evenings each week.

628. Selling and Advertising—1 Year. (Will not be given in 1943)

This course covers the basic principles of both salesmanship and advertising. Problems on the construction of individual advertisements, selling talks, and the planning of advertising campaigns, give the student an opportunity to put into practice the principles covered in the lectures.

The psychology of selling and advertising, copy writing, layout, printing and engraving, illustrations, testing of advertising, advertising campaigns, building a selling talk, retail salesmanship, and showmanship are some of the topics treated.

Two evenings each week.

630. Mechanism—1 Year

This course deals with those principles and elementary mechanism which are used in the transmission of motion through machines and mechanical devices. It requires a knowledge of the principles developed in "mechanics" and hence can be taken only by qualified students. The instruction includes pulleys, belting, gears, gearing, cams and similar topics. Home problem work and the study of a text book are required.

Two evenings each week.

631. Plane Geometry—2 Years

In this course the usual theorems and constructions of good text-books are studied. The topics include the properties of plane rectilinear figures, the circle and measurement of angles, similar polygons, areas, regular polygons and the measurement of the circle. Solutions of original exercises and applications of geometry in calculation of angles, areas, and lines will also be given. Assignments for home study will be made.

Two evenings each week.

632. Diesel Engines—1 Year

The object of this course is to present an elementary study of Diesel engines, their operation, and maintenance. The subjects studied include—the various forms of Diesel engines in general, two and four cycle, semi-Diesel, etc.; a comparison between gasoline and oil engines; fuel oils—heat value, properties; fuel injection systems—control, timing, distribution; combustion—efficiency, control, products; engine parts and their functions—assembly, clearances, wear; lubricating oils—properties, filtration; cooling systems—heat transfer, radiation; air intake and exhaust systems—supercharging, silencing, heat recovery; starting systems—air, electric, gasoline; engine installations—vibration; engine applications—mobile, stationary; and maintenance in general for an entire power plant.

No student should undertake this course who is not familiar with elementary physics and mathematics, as considerable time will be spent on the materials used and the reactions involved in an internal combustion engine. The subject requires home problem work, study of a text book, and examination at the end of each term.

Two evenings each week.

633. Shop Mathematics—1 Year

This subject deals with the practical application of mathematics which is of the greatest use to machinists or those in similar lines of work. It consists of those parts of arithmetic, algebra, geometry and trigonometry, which are essential in modern machine shop practice. Some of the topics are:—fractions and decimals, logarithms, problems in ratio and proportion, areas of surfaces, calculation of angles, solution of right and oblique triangles.

In addition to the mathematical work, the scientific principles which govern the operation of various machines are studied. In this connection the following topics are included:—verniers and micrometers, levers, belt and gear speeds, screw threads and screw cutting, gear tooth computations, plain and differential indexing. This subject requires home problem work and the study of a textbook.

Two evenings each week.

634. Air Conditioning—2 Years (Will not be given in 1943)

The subjects covered in this course include the following; fundamental laws, principles and definitions; physical properties of the atmosphere; explanation of words and terms used, such as—matter, energy, heat, heat energy, temperature, ice, water, vapor, gas, steam, thermometers, hygrometers, hydrometers, barometers, pressure, gage pressure, absolute pressure, absolute temperature, laws of gases, heat units, vapor pressure, dew point, evaporation, condensation, precipitation, relative and absolute humidity; sensible heat, latent heat, specific heat, total heat of air, effective temperature, comfort zones, air movement, ventilation; movement of heat and air, infiltration, conduction, solar heat, air leakage; heat from human beings; lights, machinery and processes; humidification and dehumidification, heating and cooling, air filtration, air washing; refrigeration and refrigerants, cooling by water, ice, typical air-conditioning equipment, typical control equipment, thermostats, humidostats, wet and dry bulb type; use of charts and tables, costs, etc.

Students are required to hand in complete details for producing prescribed conditions of temperature and humidity in some building in or near Lowell, Mass., before completing the course.

One evening each week.

635. Practical Electricity—1 Year (Will not be given in 1943)

The purpose of this course is to aid students who wish to advance themselves in any one of the electrical trades. The course will cover the underlying facts and laws of good electrical practice which the really well-informed and efficient workman must understand.

Lectures will be given one night each week on the following subjects: the nature of magnetism, Ohm's Law, simple electric circuits, combinations of series and parallel systems, wiring diagrams, electric bulbs and telephones. The practical part of the course, given one night each week, is divided into several experiments which will give the student a working knowledge of electrical wiring and installations.

Two evenings each week.

636. Elements of Electricity—2 Years

This course is planned to cover the fundamentals of electrical circuits and machinery. The lectures on electrical theory are supplemented by laboratory work, the use of a textbook, and the solution of problems. A considerable amount of home study and preparation are required. Students who wish to take this course must have studied one year of algebra.

The first year is devoted to the study of direct and alternating current circuits. The topics include Ohm's law, calculation and measurement of resistance, power, relation between electrical and other units of energy, magnetic fields, inductance, capacitance, and impedance of alternating current circuits.

The second year takes up the design and operation of direct and alternating current machinery. Part of the time is devoted to laboratory work to make the student familiar with methods of operating and testing electrical machinery.

Two evenings each week.

637. Trigonometry and Navigation—1 Year

The purpose of this subject is to aid anyone about to join the armed services in understanding problems of navigation. It is also designed for those who have a

general interest in navigation. The subject includes use of tables, solution of plane triangles, navigational instruments, piloting, great circle sailings, the sextant, time, latitude observations, lines of position, and Ageton method of solving the astronomical triangle.

Two evenings each week.

638. Blue Print Reading—1 Year

This course is offered to those who wish only to be able to read drawings. While a fundamental knowledge of orthographic projection is desirable, it is not required. The course covers methods of projection, sections, dimensioning, and standard drawing practice. Blue prints of actual commercial drawings are used.

One evening each week.

Accounting Classes (Division of University Extension)

Classes in Elementary and Advanced Accounting have been offered in past years at the Lowell Evening Textile School under the auspices of the Division of University Extension, 200 Newbury Street, Boston, Mass. Their continuance is dependent upon a sufficient expression of interest in them. Outlines of the courses, fees, etc., may be obtained by inquiry at the above address or by addressing the school.

FINISHING DEPARTMENT

In this course machine work is supplemented by lectures and discussions pertaining to the many finishes given to fabrics. The action of soaps, water, steam, heat and cold upon cloth containing one fiber or combination of fibers as used in commercial fabrics is carefully studied. This course also helps the finisher to broaden his knowledge of textile fabrics.

710. Woolen and Worsted Finishing—1 Year

The outline of this course, which is given chiefly by means of lecture work, is as follows:

BURLING AND MENDING.—Under this head are taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are also considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the various types of stocks and their modifications and development into the present type of rotary fulling mills of both single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, method of covering, regulation and means of adjusting the pressure of traps and rolls, and the use and regulation of the various types of stopmotion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hygroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the production of various degrees of felt, as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The manipulation of the various kinds of goods in the mill, viz., all wool, reworked wools and mixed goods, is studied in classroom and by operation in the laboratory.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and sours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING AND STEAMING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In the manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year.

Two evenings each week.

EVENING GRADUATES OF 1943.

Certificates awarded as follows, April 6, 1943:

Cotton Yarns—Two Years

Marcus Charles Gross, Lowell

Woolen Yarns—One Year

Stafford Russell Gill, Lowell	Norman Albert Trumbull, Lawrence
Joseph Horace Morrisette, Franklin, N.H.	Clinton Patrick Ward, Lawrence
Richard Dustin Murray, North Billerica	John Norman Ward, North Chelmsford

Worsted Yarns—One Year

William Albert Cartier, Lawrence	Charles Thomas Neild, Jr., Lowell
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Wool and Top Making—One Year

Robert Peters Aldrich, Lowell	Frank Nyder, Graniteville
Charles Francis Crafts, Lowell	Peter Martin Watkevitch, Lawrence
David Gordon Dobson, Lowell	

Woolen and Worsted Design—Three Years

Roy Fitzpatrick, Manchester, N. H.	Leroy Amos Shorette, Lowell
Francis Vincent Schiavina, Clinton	

Woolen and Worsted Weaving—One Year

Raymond Joseph Collins, Lawrence	Walter Slicer, Lawrence
Helen Stephanie Kiluk, Lowell	

Decorative Art—Three Years

Ora Dayton, Lowell	Dorothy Winifred Tulley, Lowell
Blanche Annette Gaulin, Lowell	

Pattern Alteration—One Year

Albertine Ally, Lowell	Dorothy Lorraine Kerr, Lowell
Marie Rose Simonne Ally, Lowell	Minta Agnes Leavitt, Lowell
Leona Irene Blacktin, Lowell	

Woolen and Worsted Finishing—One Year

Charles Van Annan, Lawrence	Arthur Joseph Derocher, Methuen
James Francis Berry, Lowell	Louis Armand Goyette, Lawrence

Loom Fixing—One Year

James Joseph Higgs, Lowell	Henry John Linton, Lowell
Elmer Eugene Hill, West Acton	Frank Vito Nicoletti, Clinton
Edward Francis Keough, Gleasondale	Frederick Stanton, Clinton

Textile Chemistry and Dyeing—Three Years

Bert Gilbert, Methuen

Analytical Chemistry—Three Years

Robert Ernest Oates, Chelmsford

Elementary Chemistry—Two Years

Edouard Gerard Bernier, Lawrence
 William James Flanagan, South Boston
 Mary Louise Gill, Lowell

John Alexander McKay, North Billerica
 Dennis Joseph O'Connell, Methuen
 Stanley James Sybiak, Lowell

Mechanical Drawing—Three Years

Robert Chadwick Dooley, Lowell
 George Henry Geary, Lawrence
 Anton Klug, Jr., Lawrence

Raymond Charles Reynolds, Lawrence
 James William Riley, Methuen

Blue Print Reading—One Year

Norman Fasth, Lowell
 Henry Walter Narushof, Lowell

Edward Vincent Whalen, South Chelmsford

Alternating Current Electricity—Two Years

Albert Allen Denio, Lowell

Charles Michael Kaslow, Methuen

Elements of Electricity—Two Years

Richard Osborne Edwards, Lowell
 Michael Andrew Keohane, Lowell
 John Joseph Kiernan, Lawrence

Henry Joseph Mika, Salem Depot, N. H.
 Clifford August Pihl, Lowell

Diesel Engines—One Year

Leo Bleszinski, Lawrence
 Carl George Jahnle, Billerica
 Myron Wesley Lyseth, Lowell

Stergios Pappagianis, Lowell
 Roland Joseph Pedneault, Lowell
 Philip Archibald Scott, Jr., Billerica

Trigonometry and Navigation—One Year

John Francis Berry, Lowell
 Edward Joseph Dziadosz, Methuen
 Edwin Robinson McLoon, Lowell
 Dolores Marie Regan, Lowell

Gerard Lionel Roy, Nashua, N. H.
 Robert Wilson Smith, Lowell
 Albert Wilma Waite, Methuen
 Ferdinand Zygadlo, Lowell

Mathematics—Two Years

Jason Alvra Bowling, Lawrence
 Francis Patrick Clark, Lowell
 Robert Paul Desmarais, Nashua, N. H.

Norman Fasth, Lowell
 Marina Kosartes, Lowell
 William Lawrence Peterson, Lowell

Shop Mathematics—One Year

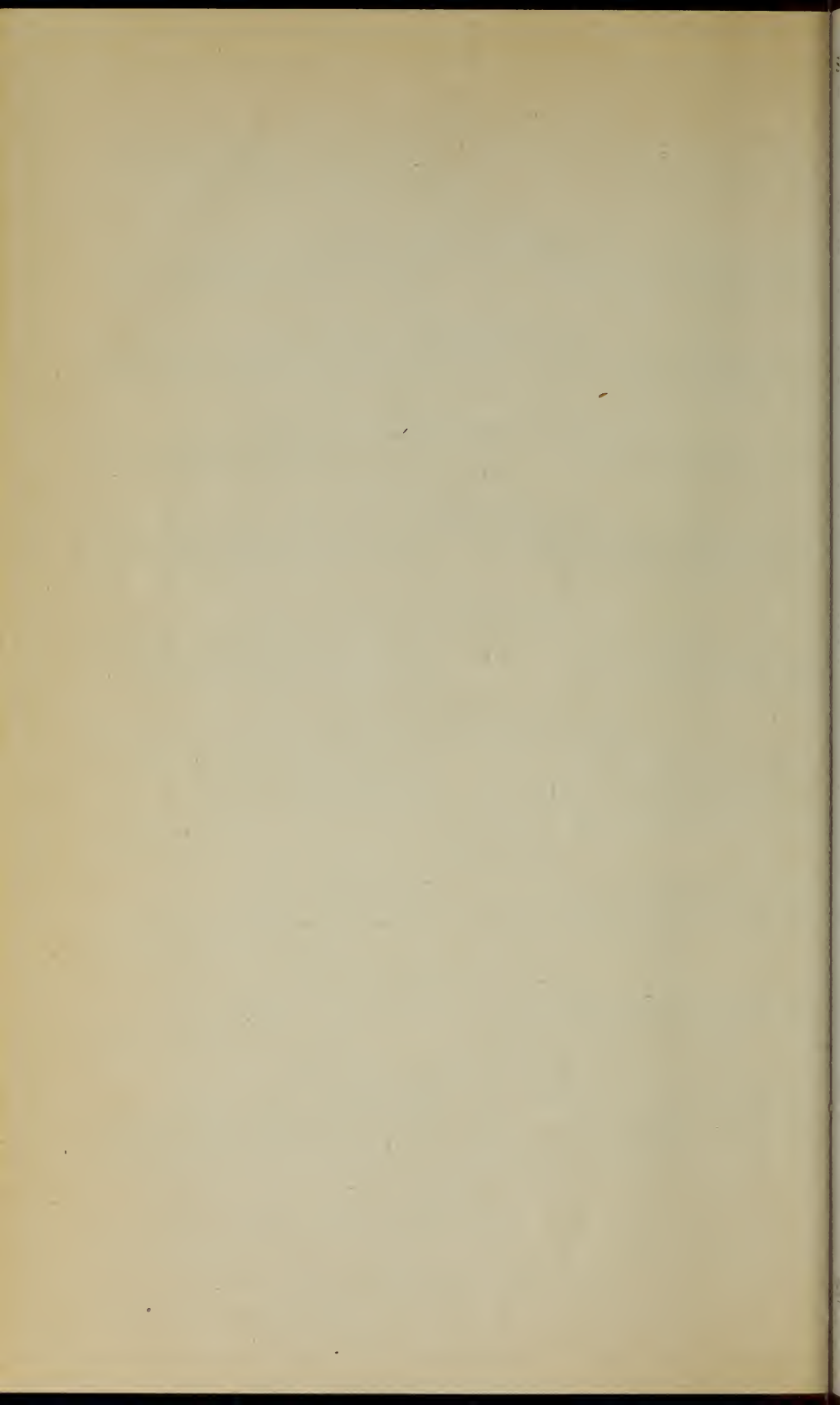
Raymond Roscoe Curtis, Lowell
 Robert Irvine McKay, North Billerica

Norman George Melendy, Lowell

Machine Shop Practice—Two Years

Roger Maurice Baribeault, Lowell
 Russell James Barry, Lowell
 Henry Daniel Burns, Lowell
 Alfred Arthur Dumais, Lowell

Wilfred Ernest Dupuis, Lowell
 Robert Drew Jackson, Lowell
 Francis Leo LaPlante, Lawrence
 Octave Abraham Montminy, Lowell



BULLETIN

of the

Lowell Textile Institute

LOWELL, MASS.

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1943

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Moody Street and Colonial Avenue

OPPORTUNITIES IN THE TEXTILE INDUSTRY FOR SCIENTIFICALLY TRAINED WOMEN

By

VITTORIA ROSATTO, B.S.

Instructor in Design Department

The textile industry is probably the oldest industry in the world. From the very beginning of time clothing of some sort was one of the essential human needs.

Today the textile industry employs the greatest number of people and has the largest invested capital of any business in the world. It is not only of prime necessity to human life but its steady advancement is also in step with higher standards of living and is indicative of a future of merit and assurance.

From history's records comes a quotation, "She is a slothful woman, she toils not, neither does she spin", which provides interesting information well worth considering. Woman had early experience in the art of spinning yarns for weaving into cloth. It was she who fashioned the garment of her personally created handiwork and sometimes dyed the fabric to add to the decorative qualities of the cloth. In short, women began with the raw material and carefully manipulated this stock through its various processes until the garment was complete. The women of old utilized processes that today, due to specialization and volume, would be handled by as many as six different textile plants.

It is not the purpose of this bulletin to trace the interesting history of the textile industry although it would be helpful, especially for those unfamiliar with its development, to relate briefly a few of the changes in the growth of this tremendous business.

The making of the garment in its entirety within one home soon gave way to its manufacture by groups of homes which divided the work to be done to best suit the ability of the individual and the need of the group. As this practice increased a certain amount of organization and management became necessary. Managerial positions at this time were generally occupied by men although the men had always helped by shearing the sheep and planting and harvesting the flax, while the skillful spinning and weaving was done by the women. Gradually men, too, became interested in the different processes and soon many became skilled workers. These organized groups were called Guilds, which flourished for many years and became highly competitive, vying with each other in producing more interesting fabrics. A few of these crafts still exist today where one may purchase hand-made homespun fabrics.

With the machine age the Guilds underwent great changes and soon the wheels of the present industry were beginning to rotate. The factory system made its appearance and with it many problems of mass manufacture. For many years women were generally employed only as skilled laborers. There were few opportunities for congenial employment for educated women. This condition, together with the lack of appreciation of the capabilities of women by the managements, precluded employment of educated women in the better positions in the textile mills.

The industry soon grew large and diversified through the growth of civilization and the higher standards of living. Greater transportation facilities and the huge increase in the demand for textiles beyond the realm of clothing caused the need of scientific research of both products and markets. From the need for individuals trained in the sciences came the rise of institutions of learning which specialized in the training of persons in such sciences as could be specifically applied to the manufacture of textiles. Textile schools were founded abroad and in the United States for the promulgation of scientific knowledge as applied to the manufacture of fabrics.

With the turn of the present century a group of progressive textile men founded the Lowell Textile Institute, then known as the Lowell Textile School. At that time courses were of three years' duration and offered a Diploma. Since then, due to the increasing demand by the industry for the scientifically trained, the courses were enriched to extend through four years of learning culminating in a Bachelor's Degree. A post-graduate year of study for a Master's Degree was also added. In 1918 the control and management of the school were transferred to the Commonwealth of Massachusetts and it has since been one of the many State Institutions of higher education.

The Lowell Textile Institute in its forty-six years has always been co-educational although only two per cent of the graduates have been women. Many of these women graduates have found pleasant and lucrative employment in the textile industry and it is increasingly evident that scientifically trained women have capabilities required in managerial, executive, creative and research positions.

The present economic stress unquestionably has helped to force this evidence, for today the demand for trained women far exceeds the number available. Women are beginning to realize the advantages of a scientific textile training and some of the opportunities open to them.

The Lowell Textile Institute offers courses in Chemistry and Textile Coloring, and Engineering. The latter has several optional courses to allow the student to specialize in his chosen branch of the industry. Any one of the courses is open to women though some are more suitable than others.

To list all the possible positions for women upon graduation would be a difficult task, but the following should in a small way suggest some of the many desirable positions.

Both the Chemist and the Engineer find their services immediately desirable in the field of research and in the field of testing.

Research laboratories have given us the many modern interesting synthetic yarns as well as the discoveries of treatments and processes which not only meet the requirements of the standards of today but also in many instances the needs for an advanced pace of civilization. The research laboratory depends on individuals equipped with a scientific background as well as logical creative imagination. This unlimited field provides many opportunities for the trained woman. Three of the women graduates of the Lowell Textile Institute are doing this work at present.

Testing laboratories are today extremely important clearing houses in the interest of both the manufacturer and the purchaser. Competition in the textile industry and requirements of purchases by specifications have necessitated rapid development in the technique of testing for uniformity and durability of the product. The label or seal of approval is the public's demand and the manufacturer's desire. Testing positions have attracted many and it is gratifying to find women capable and in demand in this progressive branch of the industry. To date two of our women graduates hold positions in such laboratories.

The teaching of chemistry and engineering subjects, as well as textile, especially by women, deserves consideration. The graduate of an accredited textile college such as the Lowell Textile Institute may choose a teaching position in a high school, junior college or senior college. The Lowell High School has in its employ a woman graduate of the Lowell Textile Institute.

Two Lowell women graduates of the Engineering Department have realized opportunities in the field of buying. Many mills buy fabrics from other mills to be further processed for public consumption. In this capacity the buyer for this mill must apply her textile engineering training and judge soundly each purchase. She must know every detail of the processing of her mill and buy fabrics particularly suitable. With a textile training she knows in detail the construction of the fabrics and what to expect of them.

Textile chemists are important in the field of buying, because in purchasing chemicals and equipment which are necessary in manufacture much depends on their composition as well as their proper use. In direct ratio, selling with a

scientific chemistry training has afforded responsible positions to many graduates of the chemistry course. Although the chemistry course at the Lowell Textile Institute specializes in textiles it is broad in its teachings and many graduates are now engaged in chemistry vocations other than textiles.

The field of selling has at the time of this writing been neglected by trained women. The salesman in the textile industry is still rightfully named. Nevertheless many large progressive stores have had experts give elementary courses in textiles to their clerks to better acquaint them with terms and general knowledge of the fabrics they sell. This is also true of ready to wear departments. The buyers for these departments are very often women, except in the men's wear department, with a keen business sense whose purchases are governed by sales. A scientific textile knowledge for this individual who deals in one of the keenest and most competitive branches of the industry would go far in making her store one of distinction as well as aid in its prosperity.

The field of textile designing, one of the optional courses in the Engineering Department, is primarily concerned with the construction of the fabric. The designer is equipped with the knowledge of every process of manufacture from the raw fiber to the finished product. His layouts are carried out by the mill and he must foresee every detail and design his fabric accordingly. Here then is a rich field for women, for they have a natural understanding of the correct weight, drape, texture and color to suit the purpose. We have one graduate of the Lowell Textile Institute who at present is adding her scientific knowledge to the designing of future fabrics.

Some women graduates, after a brief period in the industry, have married and some though married have continued with their profession. As a housewife this woman is unique. Her training has provided her with practical scientific knowledge of every fabric in the home and in the wardrobe.

Nothing has been said of salaries, but with competition so keen in the many different professions it may be of interest to state that salaries are above average at the start and promotions unlimited.

The field for women in textile manufacture is broadening rapidly. The high school graduate of today would do well to look into the possibilities of a scientific textile college training.

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DEVELOPMENT OF METHODS FOR IMPROVING OLIVE DRAB UNIFORM FABRICS

By

LOUIS A. OLNEY, S.B., M.S., Sc.D.

In July 1941 the Quartermaster Department of the United States Army requested the American Association of Textile Chemists and Colorists to investigate ways and means for improving the color fastness of olive drab wool fabrics to weather and light, perspiration and dry cleaning.

A representative committee was formed to investigate this whole subject and extended experimental work was done in many laboratories of the textile manufacturing concerns and dyestuff distributors. The testing of the many samples submitted from these laboratories was done largely at the Lowell Textile Institute and carried out by Mr. Bertil A. Ryberg, under the supervision of Louis A. Olney, Chairman of the A.A.T.C.C. committee. In all some 287 samples were exposed to weather 10, 20 and 30 days and tested otherwise. Out of a considerable number of dyestuffs considered as possibilities for the production of olive drab on wool, the following were selected as probably being the most satisfactory for the experimental trials.

Browns

Picramic or Metachrome Brown B
Acid Anthracene Brown PG

Blue Blacks

Alizarine Blue Black B
Monochrome Black Blue G

Yellows

Eriochrome Flavine A
Alizarine Yellow 2G
Anthracene Yellow C

Approximately 150 combinations of these seven dyes as well as other similar dyes were submitted by members of the committee or other cooperators, and sixteen additional samples were submitted by the Philadelphia Quartermaster Depot for examination. These samples were all scoured together, then exposed to weather 10, 20 and 30 days during the month of August at the Lowell Textile Institute. The samples were again scoured after exposure. They were then submitted for examination by the committee and eight were selected as of a definitely high degree of fastness. Two of the eight selected were made into actual mill pieces and a second series of exposures made, this time with 137 samples, 103 laboratory dyeings and 34 finished pieces.

Eleven Laboratory Dyeings, in the opinion of the appraisers, exhibited much better fastness than the Standard P selected at the Sept. 18, 1941, meeting from the samples submitted by the Q.M. Depot. Some of these dyeings were pronounced better than others.

The 16 finished samples (actual mill production as recommended at the Sept. meeting) were evaluated also. The following combinations were found to be much faster than the Q.M. Standard P. (There is no connection between order and fastness.)

- | | |
|--------------------------------------|--------------------------------|
| 1. 1.25% Omega Chrome Brown RLL | 2. 1.38% Eriochrome Flavine A. |
| 0.80 Anthracene Yellow C | 0.60 Eriochrome Olive BL |
| 0.80 Eriochrome Flavine A | 1.84 Eriochrome Brown DKL |
| 0.80 Chrome Black Blue G | Dyed Chromate |
| Dyed Chromate | |
| 3. 1.24% Aliz. Yellow 2G Single Str. | 4. 2.00% Aliz. Yellow 2GA |
| 1.20 Picramic Brown | 0.89 Acid Anth. Brown B |
| 1.37 Acid Anth. Brown PG | 0.45 Aliz. Blue Black B |
| 0.48 Chrome Black Blue G Dyed | Boil 15 mins., add 1½% |
| Chromate | Chrome |

5. 1.58% Eriochrome Flavine A Xtra	6. 2.00% Aliz. Yellow 2G Conc.
0.48 Acid Anth. Brown B	0.75 Acid Anth. Brown B
0.73 Acid Anth. Brown PGA	0.45 Aliz. Blue Black BN
0.60 Chrome Black Blue G	Boil 15 mins., add Chrome
Dyed Topchrome	

Numbers 3 and 6 were the formulas recommended at the September meeting for testing in the finished O.D. piece. Number 3 was changed somewhat from the original laboratory formula by cutting down on the Yellow component, increasing the Brown and using Black Blue G alone instead of with Blue Black B. Number 6 does not look as good in the finished piece as in the laboratory dyeing.

The following list shows that 11 different dyes were used in the finished pieces.

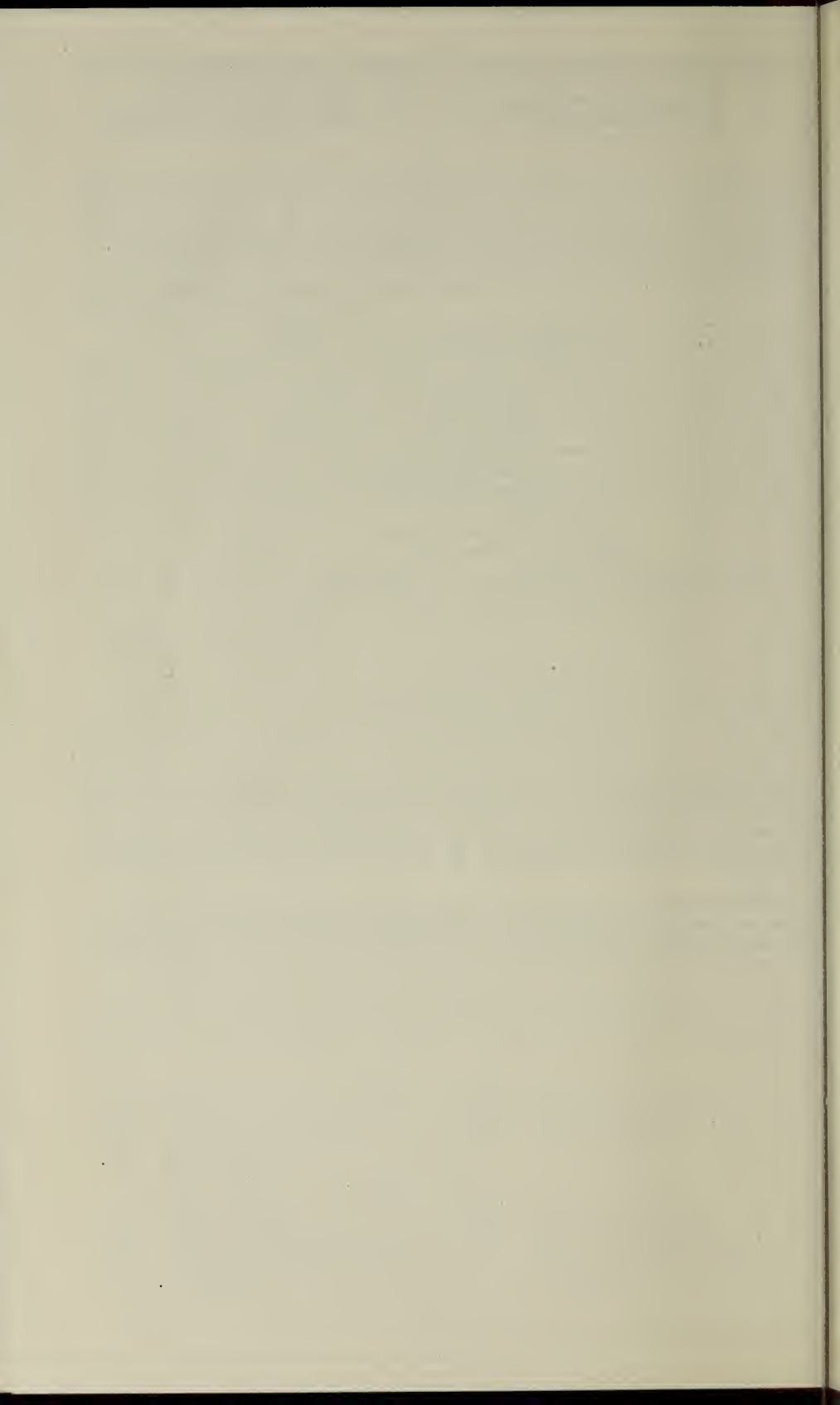
Eriochrome Flavine A.....	CI 219
Anthracene Yellow C.....	343
Aliz. Yellow 2G.....	36
Eriochrome Olive BL.....	—
Aliz. Blue Black B.....	1085
Chrome Black Blue G.....	—
Acid Anthracene Brown B.....	Pr. 2
Acid Anthracene Brown PG.....	4
Picramic Brown	CI 101
Omega Chrome Brown RLL.....	—
Eriochrome Brown DKL.....	—

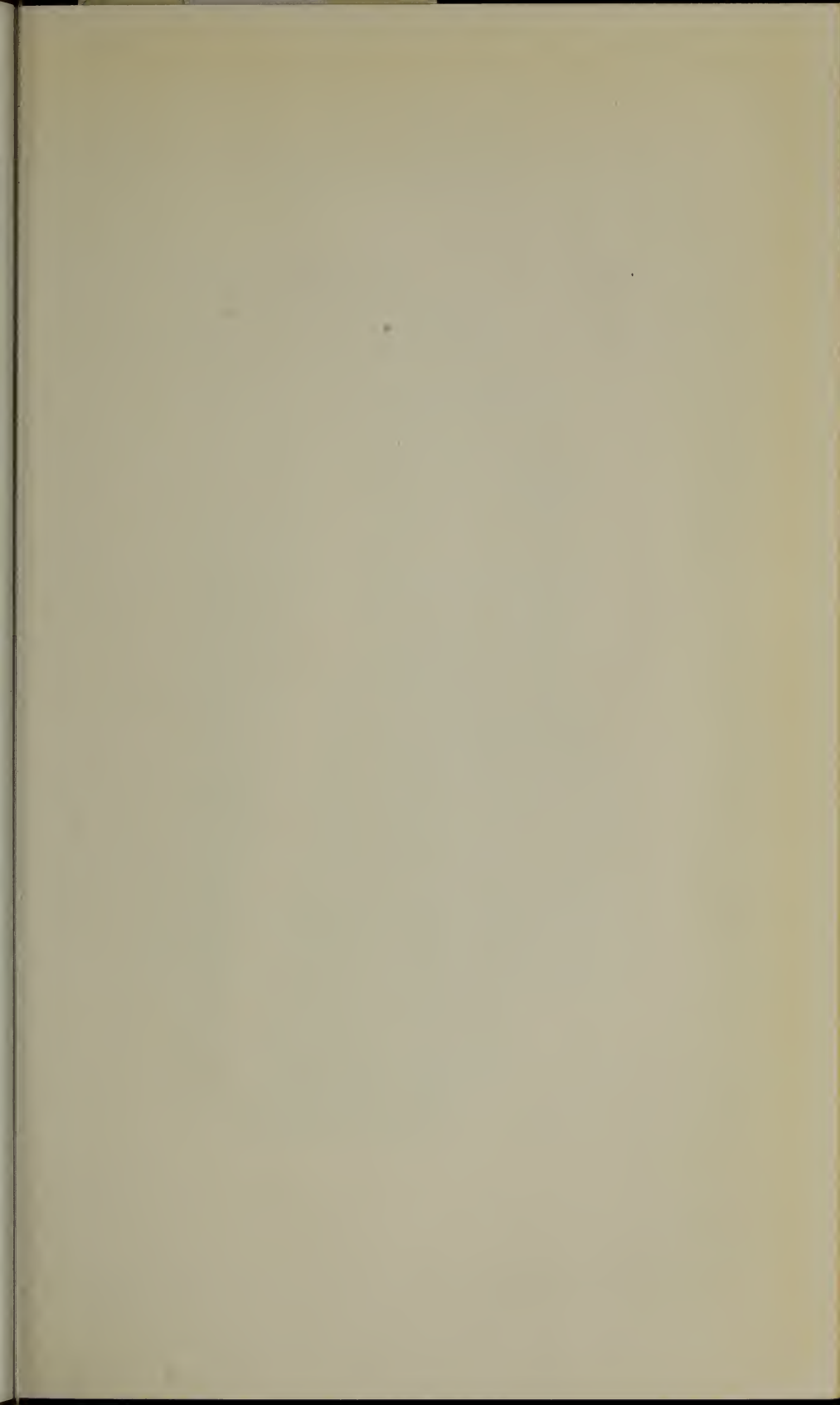
The Laboratory Dyeings include the above dyes plus:

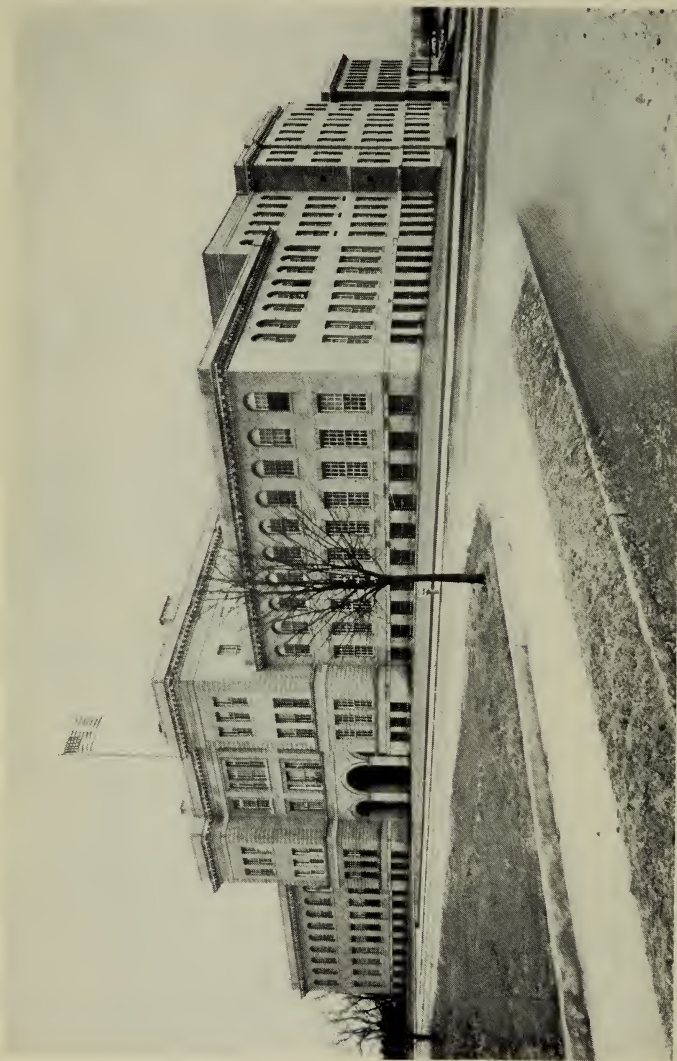
Suprachrome Yellow RN.....	CI 197
Acid Aliz. Garnet R.....	168
Metachrome Red G.....	—
Olive Brown No. 93 (Zinsser)	—
Palaside Brown B.....	—
Calochrome Fast Green SGV.....	CI 292

During this investigation many points were brought out which proved to be of considerable value, not only to the Quartermaster Department but also to different manufacturing companies producing the regular run of material for the Government. It was the consensus of opinion that the committee has very definitely shown that better fastness can be produced without upsetting production schedules.

The committee is continuing its investigation and at the present time four series of samples are being exposed in different parts of the North American continent in order that an average weather condition can be arrived at for the country as a whole. This could then form the basis for an accelerated weather test.







Southwick Hall

Louis Pasteur Hall

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CALENDAR

1943-1944

September 14-15, Tuesday-Wednesday . . .	Entrance Examinations
September 13-18, Monday-Saturday . . .	Re-examinations
September 16, Thursday, 9.30 A.M.	Registration for Freshmen
September 20, Monday	Registration for upper-class students
September 21, Tuesday	Classes begin for Freshmen
October 12, Tuesday	Classes begin for upper-class students
November 11, Thursday	Columbus Day — Holiday
November 24, Wednesday, 4.00 P.M.	Armistice Day — Holiday
November 29, Monday, 8.50 A.M.	Thanksgiving recess begins
December 17, Friday, 4.00 P.M.	Thanksgiving recess ends
January 3, Monday, 8.50 A.M.	Christmas recess begins
January 17, Monday	Christmas recess ends
January 28, Friday	First term examinations begin
	End of first term
January 31, Monday	Second term begins
February 22, Tuesday	Washington's Birthday — Holiday
March 31, Friday, 4.00 P.M.	Spring recess begins
April 10, Monday, 8.50 A.M.	Spring recess ends
April 19, Wednesday	Patriots' Day — Holiday
May 22, Monday	Second term examinations begin
May 30, Tuesday	Memorial Day — Holiday
June 6, Tuesday	Commencement
June 8-9, Thursday-Friday	Entrance Examinations

1944-1945

September 12-13, Tuesday-Wednesday . . .	Entrance Examinations
September 11-15, Monday-Friday	Re-examinations
September 14, Thursday, 9.30 A.M.	Registration for Freshmen
September 18, Monday	Registration for upper-class students
September 19, Tuesday	Classes begin for Freshmen
October 12, Thursday	Classes begin for upper-class students
November 11, Saturday	Columbus Day — Holiday
November 22, Wednesday, 4.00 P.M.	Armistice Day — Holiday
November 27, Monday, 8.50 A.M.	Thanksgiving recess begins
December 20, Wednesday, 12.25 P.M.	Thanksgiving recess ends
January 3, Wednesday, 1.25 P.M.	Christmas recess begins
January 15, Monday	Christmas recess ends
January 26, Friday	First term examinations begin
	End of first term
January 29, Monday	Second term begins
February 22, Thursday	Washington's Birthday — Holiday
March 23, Friday, 4.00 P.M.	Spring recess begins
April 2, Monday, 8.50 A.M.	Spring recess ends
April 19, Thursday	Patriots' Day — Holiday
May 21, Monday	Second term examinations begin
May 30, Wednesday	Memorial Day — Holiday
June 5, Tuesday	Commencement
June 7-8, Thursday-Friday	Entrance Examinations

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FOR TERM ENDING JUNE 30, 1944

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EDWARD C. ENO, Lowell Electric Light Corporation

MYRON S. FREEMAN, Worcester, Vice-President, The Bell Company

MELVILLE WESTON, Lowell, Treasurer, Newmarket Manufacturing Company

FOR TERM ENDING JUNE 30, 1945

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ROLAND E. DERBY, Lawrence, Proprietor, The Derby Company

HAROLD V. FARNSWORTH, Boston, Textile Engineer, Atkinson, Haserick & Company

STEPHEN R. GLEASON, Lowell, Superintendent, Walter L. Parker Bobbin & Spool Company

J. EMILE LEMIRE, Lowell, Teacher, Lowell High School

FOR TERM ENDING JUNE 30, 1946

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Assistant Professor in Wool Department	
MARTIN JOHN HOELLRICH	30 Saxonia Avenue, Lawrence
Assistant Professor in Weaving Department	
ELMER EDWARD FICKETT, B.S.	162 Hovey Street
Assistant Professor in Chemistry and Dyeing Department	
HAROLD CANNING CHAPIN, Ph.D.	290 Pine Street
Assistant Professor in Chemistry and Dyeing Department	
CHARLES LINCOLN HOWARTH, B.T.C.	North Billerica
Assistant Professor in Chemistry and Dyeing Department	
HARRY CHAMBERLAIN BROWN, S.B.	272 Merrimack Street
Assistant Professor in Textile Engineering Department	
JAMES GUTHRIE DOW, A.B.	11 Robbins Street
Assistant Professor in Language Department	
A. EDWIN WELLS, B.T.E., Ed.M.	37 Ashland Street, Melrose Highlands
Assistant Professor in Textile Engineering Department	
JAMES HARRINGTON KENNEDY, JR., B.T.E., M.S.	(On leave of absence)
Assistant Professor in Wool Department	
CHARLES FREDERICK EDLUND, B.S., Ed.M.	(On leave of absence)
Assistant Professor in Textile Engineering Department	
JOHN HENRY SKINKLE, S.B., M.S.	Chelmsford
Assistant Professor in Chemistry and Dyeing Department	
HORTON BROWN, B.S.	178 Atlantic Avenue, Marblehead
Assistant Professor in Textile Engineering Department	
WINFORD SYKES NOWELL, B.M.E.	5 Fulton Street, Methuen
Assistant Professor in Finishing Department	
NATHANIEL ERSKINE JONES	19 Maryland Avenue
Assistant Professor in Cotton Department	
CHARLES HARRISON JACK	68 Canton Street
Instructor in Textile Engineering Department	
RUTH FOOTE, A.B., S.B.	46 Victoria Street
Instructor and Registrar	

ALBERT GREAVES SUGDEN	673 School Street
Instructor in Weaving Department	
RUSSELL METCALF FOX	359 Beacon Street
Instructor in Textile Design Department	
CHARLES ARTHUR EVERETT, B.T.C.	Chelmsford
Instructor in Chemistry and Dyeing Department	
WILLIAM GEORGE CHACE, Ph.B., M.S.	(On leave of absence)
Instructor in Chemistry and Dyeing Department	
JOHN LESLIE MERRILL, B.T.E.	2026 Middlesex Street
Instructor in Weaving Department	
MILTON HINDLE, B.T.E.	25 Thurston Road, Melrose Highlands
Instructor in Textile Engineering Department	
WALDO WARD YARNALL, B.S.	(On leave of absence)
Instructor in Physical Education	
VITTORIA ROSATTO, B.S.	63 Bradstreet Avenue
Instructor in Textile Design Department	
CHARLES LINCOLN DALEY, B.T.C.	392 Princeton Street
Instructor in Chemistry and Dyeing Department	
CARL ARTHUR CARLSON, B.S., M.E.	(On leave of absence)
Instructor in Textile Engineering Department	
PAUL CHARLES PANAGIOTAKOS, S.B., Ph.D.	290 Branch Street
Instructor in Chemistry and Dyeing Department	
PAUL DAVID PETTERSON	East Chelmsford
Instructor in Textile Engineering Department	
HENRY LELAND PERO, B.T.E.	Chelmsford
Instructor in Wool Department	
ELMER PERCY TREVORS	18 Rhodora Street
Assistant Instructor in Chemistry and Dyeing Department	
DONALD CHESTER ROBERTS	Chelmsford
Student Instructor in Cotton Department	
WALTER BALLARD HOLT	37 Albert Street
Bursar	
FLORENCE MOORE LANCEY	46 Victoria Street
Librarian	
HELEN GRAY FLACK, S.B.	445 Stevens Street
Secretary	
MONA BLANCHE PALMER	685 Westford Street
Clerk	
THERESA D. LEBLANC	86 White Street
Clerk	

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HISTORICAL SKETCH
of the
LOWELL TEXTILE INSTITUTE

By virtue of legislative acts of 1928, the Lowell Textile School became known as the Lowell Textile Institute in order to define more clearly the standing of the institution. This was the natural result of the development of the original ideas and policies of the trustees who founded the Lowell Textile School. The articles of incorporation were authorized by Chapter 475, Acts of 1895, and provided for a corporation to be known as the Trustees of the Lowell Textile School of Lowell, Massachusetts. The movement for the establishment of the school dates from June 1, 1891, but it was not opened for instruction until February 1, 1897.

In accordance with the acts of incorporation the Board of Trustees consisted of twenty permanent and self-perpetuating members, three-fourths of whom must be "actively engaged in, or connected with, textile or kindred manufactures." In addition, his Honor the Lieutenant-Governor, the Commissioner of Education of the State, the mayor, the president of the municipal council, the superintendent of schools of Lowell, and a representative of the textile council were members *ex-officio*. Legislative acts of 1905 and 1906 authorized the graduates of the school to elect four trustees serving for periods of four years each.

By virtue of the anti-aid amendment to the State Constitution, and by Chapter 274, General Acts of 1918, the property of the school was transferred on July 1, 1918, to the Commonwealth of Massachusetts, and the control and management of the school was vested in a Board of Trustees appointed by the Governor, "with all the powers, rights and privileges and subject to all the duties" of the original Board.

In locating the Institute at Lowell, which has been called the "Mother Textile City of America," considerable advantage is secured by close association with every branch of the industry, which utilizes almost every commercial fiber in the products of the great Merrimack Valley textile district.

Although the school was formally opened by Governor Roger Wolcott on January 30, 1897, in rented quarters in the heart of the city, it was not until January, 1903, that the first buildings of the present plant were ready for occupancy. On February 12, 1903, Governor John L. Bates dedicated the present buildings.

PURPOSE AND SCOPE OF THE INSTITUTE

The object of the establishment of the Institute as set forth in the original act was "for the purpose of instruction in the theory and practical art of textile and kindred branches of industry."

The plan was occasioned by the apparent crisis in the leading industry of New England, due to the rapid development of the manufacture of the coarser cotton fabrics in the southern States. It was believed that this crisis could be met only by a wider and more thorough application of the sciences and arts in the production of finer and more varied fabrics.

Following the general methods and systems found successful at the higher polytechnic institutes, it offers thorough instruction in the principles of the sciences and arts applicable to textile and kindred branches of industry. The courses treat not only of the theory but also the application of these principles in the processes, on the machines and throughout all departments of industry involved in the successful manufacture, application and distribution of textile material in any form.

Though from the first the management has kept in view the clearly defined objective which called for the establishment of the Institute, it has developed its curriculum, its methods of instruction, and equipment as the needs of the industry arose. This objective will be kept constantly in view, and as new demands are presented an effort will be made to extend courses, equipment and floor space. The mechanical equipment of the Institute includes the best makes of textile machinery, and these machines, while built as they would be for regular work, are, as far as possible, adapted to the experimental work which is of particular value in such an institution as this.

Because of the breadth, grade and character of instruction given, and because of the standing and personnel of the instructing staff, the Institute has been placed

by both Federal and State educational boards in the class of the higher technological schools of this country.

The United States Civil Service Commission recognizes graduates from the degree courses of this school as proper applicants for the examination to the various positions requiring a knowledge of applied science and engineering, as well as a knowledge of textile manufacturing, in the different departments of the government.

The courses for those students who can attend the day classes are organized to prepare them to enter some one of the various branches of the textile industry. It is required that all such students shall have an educational background equivalent to that of a complete college preparatory course as given by a recognized high school or academy. These textile courses are either of three or four years duration and are described in detail on the following pages of this catalogue.

The evening classes are held for about twenty weeks of the year, and are for those who are unable to attend the day courses. These are similar to the day courses, but are aimed especially to meet the needs of students working during the day in the mills and shops. For entrance to these classes an applicant should have the equivalent of a grammar school education. A detailed description of these courses and requirements is given in another Bulletin, which will be sent upon request.

BUILDINGS AND GROUNDS

The site is a commanding one, consisting of about 15 acres at a high elevation on the west bank of the Merrimack River. It extends to and overlooks the rapids of Pawtucket Falls, which was the first water power in America to be used on an extensive scale to operate power looms. It was contributed by Frederick Fanning Ayer, Esq., of New York City, and the Proprietors of the Locks and Canals on the Merrimack River.

Southwick Hall, the main building, fronting on Moody Street, was contributed by the Commonwealth of Massachusetts and Frederick Fanning Ayer, Esq., and is a memorial to Royal Southwick, a leading textile manufacturer, a public man of earlier days, and a maternal ancestor of Mr. Ayer. It includes a central mass 90 by 90 feet, having three stories and two wings 80 by 85 feet each with two stories and well-lighted basements. The building is pierced in the center by an arched way from which access is had to the wings and to the central courtyard. The northern wing is occupied by the General Offices, Engineering and Finishing Departments, and Library, while the southern wing is occupied by the Chemistry and Dyeing Departments.

Kitson Hall, dedicated to the memory of Richard Kitson, was contributed by Charlotte P. Kitson and Emma K. Stott, his daughters; the Kitson Machine Company of Lowell, founded by Mr. Kitson, was also a generous contributor. This hall makes a right angle with Southwick Hall, is 70 by 183 feet, has two stories and a basement and houses the Cotton Yarn and Knitting Departments, the Mechanical and Electrical Engineering laboratories and the Machine Shop.

The Falmouth Street Building forms the third side of the quadrangle, and consists of three portions, one 60 by 75 feet, three stories, one 75 by 130 feet, three stories, and the head house 70 by 80 feet, three stories and basement. The building is occupied by the picker section of the Cotton Yarn Department, the Design and Power Weaving Department and by the Woolen and Worsted Yarn Department, and contains on the lower floors an equipment for the manufacture of wool yarn from the fleece to the finished yarn. The upper floors are occupied by a great variety of plain, dobby and Jacquard looms, and in a section of the building are the students' lockers and recreation rooms.

Louis Pasteur Hall. By means of a special appropriation made by the Legislature of 1937 a three story addition was placed on a single story building that was previously known as the Colonial Avenue Building which was erected in 1910. This Hall contains on the first floor the Cotton Finishing laboratory with class rooms and offices of the Wool Department. On the upper floors are found the laboratories, class and lecture rooms, library, and research laboratories of the Chemistry and Textile Coloring Department.

CAMPUS

Through the generosity of Mr. Frederick Fanning Ayer the Institute has been provided with a campus and athletic field of about 3 acres. This has been carefully graded and laid out for football and track athletics.

To enclose this field the Alumni Class Fence has been partly built. It is made of forged iron sections supported between brick columns. Each section is contributed by a class, so that in the course of a few years this fence will entirely enclose the field.

In addition to this field there has been developed during the past few years a larger area that was used for baseball for the first time during 1938. This is located northeast of the Institute buildings and will, it is hoped, be further improved to make a modern campus for baseball and other sports.

GENERAL INFORMATION

Application for Admission.—A blank form of application for admission may be found at the end of this bulletin. This should be properly filled out by all applicants, whether entering upon certificate from a secondary school or presenting themselves for examination.

Freshman Registration.—Each freshman is expected to be in daily attendance beginning Thursday, September 14, at 9.30 A.M., and to follow the prepared program which will be placed in his hands. A program which is planned to acquaint the new student with the institution, its location and surroundings, its courses of instruction, its recreational activities and other phases of its life is arranged for the opening week. Unless arrangements for room and board are made previously, the first two days of the week may be used for this purpose. Physical examinations as well as certain other tests are given during this orientation period. Freshman week enables the student to secure the advantages which come from acquaintance with his surroundings, his instructors, the members of his class, student organizations, activities and customs. The overcrowding of the first week of classes with distractions is thus avoided.

Registration.—All upper classmen are required to register on or before the Monday of the week beginning the school year, and all students during the midyear examination period. For unexcused delay in registration a fee of \$5 will be imposed.

Sessions.—The regular school sessions are in general from 8.50 A.M. to 12.20 P.M., and from 1.25 to 4.00 P.M., except Saturdays, when no classes are held. On Saturdays the buildings are closed.

An hour plan designates the hours at which the various classes meet. This is rigidly adhered to, and the student is marked for his attendance and work as therein scheduled.

Attendance.—Attendance is required of all students on fourteen-fifteenths of all scheduled class exercises, provided they meet the requirements of their instructors for the omitted exercises. For every unexcused absence from any class exercise in excess of those allowed, a deduction will be made from the mark obtained in the course in which the absences occurred.

Advisers.—Advisers are appointed for all students, to be of such aid and assistance as they can both inside and outside of school hours. The head of the department in which a student is registered is adviser to upper-classmen, and instructors in charge of freshmen classes act as advisers to freshmen.

Conduct.—Students are required to return to the proper place all instruments or apparatus used in experimental work, and to leave clean and in working order all machinery and apparatus with which they may experiment. All breakages, accidents or irregularities of any kind must be reported immediately to the head of the department or instructor in charge.

Irregular attendance, lack of punctuality, neglect of either school or home work, disorderly or ungentlemanly conduct or general insubordination are considered good and sufficient reasons for the immediate suspension of a student, and a report to the trustees for such action as they deem necessary to take.

It is the aim of the trustees so to administer the discipline of the Institute as to

maintain a high standard of integrity and a scrupulous regard for trust. The attempt of any student to present, as his own, work which he has not performed, or to pass an examination by improper means, is regarded by the trustees as a most serious offense, and renders the offender liable to immediate suspension or expulsion. The aiding or abetting of a student in any dishonesty is also held to be a grave breach of discipline.

Any student who violates these provisions will be immediately suspended by the president, and the case reported at the following meeting of the trustees for action.

Examinations.—For first-year students examinations are held every five weeks, and these serve to inform the student concerning his standing and the progress made. For students in upper classes examinations will be held during the eighth week of each term. Final examinations are held at the end of each term.

In general, the examinations cover the work of the preceding term, but at the discretion of the instructor may include work of earlier terms.

Examinations for students conditioned in first-term subjects are held during the second term, and examinations for students conditioned in the second-term subjects are held in September following.

Any student who fails to complete a subject satisfactorily or to clear a condition at the time appointed, will be required to repeat the subject, and he cannot be admitted to subjects dependent thereon.

A student whose term's standing is as a whole so low that he cannot continue with profit the work of the next term will be required to leave, but he may return the following year to repeat such subjects as are required.

Daily work and regularity of attendance are considered in making up the reports of standing.

Records and Reports of Standing.—During each term informal reports are sent to parents or guardians and to all students; and at the end of each term formal reports are made.

The daily work of the student forms an important part of his record, and no pupil will be awarded the diploma or degree unless this portion of his record is clear.

Books are prescribed for study, for entry of lecture notes and other exercises, and are periodically examined by the lecturers. The care and accuracy with which these books are kept are considered in determining standing.

Library and Reading Room.—That the students may have surroundings conducive to reading and study a moderate-sized reading room with library tables and chairs has been provided. The library shelves contain textile, art, engineering and scientific publications. These are increased from time to time as new technical books of value to textile students are issued from the press. The leading textile papers are kept on file for ready reference.

The Chemistry and Dyeing Department also has a library supplied with books and periodicals which pertain to chemistry in general and textile chemistry and dyeing in particular.

FEES, DEPOSITS, ETC.

Tuition Fee.—The fee for the day course is \$150 per year for residents of Massachusetts. For non-residents the fee is \$250 per year. The fee for students from foreign countries is \$500 per year.

Three-fifths of the fee is charged for a single term. Each term's tuition is payable during the first week of that term. Students failing to make this payment at the specified time will be excused from classes until satisfactory explanation and arrangements for payment can be made. No report of a student's standing will be mailed unless tuition and fees are fully paid. After payment is made no fee or part thereof can be returned, except by special action of the trustees. The above fee includes free admission for any day students desiring to attend any of the evening classes in which there is accommodation.

Special students pay, in general, the full fee, but if a course be taken involving attendance at the school during a limited time, application may be made to the president for a reduction.

Students entering from Massachusetts are required to file with the Bursar a statement signed by either town or city clerk, stating that the applicant's father is a legal resident of Massachusetts.

Athletic Fee.—An athletic fee of \$15 is due and payable at the time of the first payment of tuition.

Deposits.—Students taking chemistry make a deposit of \$25 the first year, and \$25 each term for the second, third and fourth year chemistry course; students taking machine shop are required to make a deposit of \$10. All other students are required to make a deposit of \$10 each year to cover any general breakage.

All deposits must be made before students can be admitted to laboratory work. The unexpended balance of any deposit will be returned at the end of the year to students not otherwise in arrears.

Student Aid.—The Student Work Program under the National Youth Administration for Massachusetts has been carried on during the years that these funds have been available. The average amount earned by each student assigned to a project is approximately ten dollars per month. Applications should be made to the General Office at the Institute.

Rooms and Board.—Students from a distance, requiring rooms and board in the city, may, if they desire, select same from a list which is kept at the Institute. The cost of rooms and board in a good district is \$12 per week and upwards.

Books and Materials.—Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Each student must provide himself with proper outer garments and wear them in such a manner when working in the various laboratories that clothing and person will be protected and not endangered by moving machinery or chemicals.

All raw stock and yarn furnished to the students, and all the productions of the Institute, remain or become its property, except by special arrangement; but each student is allowed to retain specimens of yarn or fabrics that he has produced, if mounted and tabulated in accordance with the requirements of the department. It is understood that the departments may retain such specimens of students' work as they may determine.

No books, instruments or other property of the Institute are loaned to the students to be removed from the premises except by special permission.

Summary of Expenses per Year

Tuition (residents of Massachusetts)	\$150
Tuition (residents of other States)	250
Tuition (foreigners)	500
Chemistry laboratory deposit (1st year)	25
Chemistry laboratory deposit (2d, 3d and 4th years)	50
Athletic fee	15
Machine shop deposit	10
General breakage fee	10
(This applies to students who do not take chemistry or machine shop.)	
Books and supplies	50
(Books and supplies for the first year cost about \$80, second and third year \$35, and fourth year \$50, thus averaging about \$50 per year for the four years.)	

ENTRANCE REQUIREMENTS

Particular stress should be laid upon a thorough grounding in mathematics, including algebra, arithmetic and plane geometry, as these form the basis upon which the work of this school rests. While solid geometry is not required at the present time, the student will find a knowledge of this subject very valuable in his subsequent work, and is strongly recommended to include this subject as one of his electives. A preliminary course in science, including physics and chemistry, serves to prepare the student's mind for the higher branches of these subjects and their application, but neither will be considered as the equivalent of the courses in these branches given in the Institute.

Degree Courses

Candidates for admission to either of the degree courses must be graduates of a school approved by the New England College Entrance Certificate Board or by the Board of Regents of New York, and must present a certificate from the principal of the school last attended, reporting upon the subjects pursued and the points obtained according to the schedule of studies given hereafter. A total of fifteen points is required.

A point represents satisfactory work in a year's study in a specified subject in an approved secondary school.

Required Subjects

Algebra A1	1
Algebra A2	1
English	4
Language other than English	2
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
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Elective Subjects

	Points
Elementary French (two years) or }	2
Elementary German (two years) }	
Advanced French or German (one year in addition to requirements of Elementary French A or Elementary German A)	1
History:	
American	1
Medieval and Modern	1
English	1
Latin	1
Mechanical Drawing	1
Mechanic Arts	1
Solid Geometry	1
Spanish	1
Trigonometry	1

An applicant may also be admitted on the basis of entrance examinations, in which case he must pass a sufficient number of the required subjects to make eleven points and present certificates showing satisfactory courses in such of the elective subjects to make four additional points.

The objective of the elective requirements is to encourage greater breadth of preparation than that covered by the required branches. Certificates covering other subjects than those listed as elective will be entertained.

Diploma Courses

Candidates for admission to the diploma courses are accepted upon presentation of properly vouched certificates showing the completion of a regular four-year course in a high school or academy of reputable standing. The certificate must specify that the applicant has satisfactorily passed the required subjects.

A total of thirteen points is required.

Required Subjects

	Points
Algebra A1	1
Algebra A2	1
English	4
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 10

Elective Subjects

Four may be selected from the list under Degree Courses.

ENTRANCE EXAMINATIONS

All students who are unable to present a certificate for either the degree or the diploma courses must pass entrance examinations. Notification of intention to take these examinations must be made in writing at least a week before the date of the examinations. These will be held as follows:—

Thursday, June 8, 1944; Tuesday, September 12, 1944; Thursday, June 7, 1945:—

Algebra, 9 A.M. to 11 A.M.

History, 11 A.M. to 1 P.M.

English, 2 P.M. to 4 P.M.

Friday, June 9, 1944; Wednesday, September 13, 1944; Friday, June 8, 1945:—

Plane Geometry, 9 A.M. to 11 A.M.

German or French, 11 A.M. to 1 P.M.

Chemistry, 11 A.M. to 1 P.M.

Physics, 2 P.M. to 4 P.M.

Candidates failing to pass the June examinations are allowed to try again in September; those who cannot attend the June examinations may present themselves in September.

REQUIRED SUBJECTS FOR ENTRANCE

Algebra A1.—Derivation and use of simple formulas, graphical representation, the meaning and use of negative numbers, linear equations, with one or two unknown quantities, ratio and proportion, the essentials of algebraic technique, simple cases of exponents and radicals.

Algebra A2.—Numerical and literal quadratic equations in one unknown quantity, the binomial theorem for positive integral exponents, arithmetic and geometric series, simultaneous linear equations in three unknown quantities, simultaneous equations consisting of one quadratic and including graphical solutions, exponents and radicals.

Plane Geometry.—The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures, the circle and the measurement of angles, similar polygons, areas, regular polygons, and the measurement of the circle. The solution of original problems and problems in mensuration of lines and plane surfaces.

Chemistry.—Requirements are those of the New England College Entrance Board, or the Board of Regents of New York, including personal laboratory work. Those not meeting the requirements by school or college certificate will be subject to written examination.

English.—As secondary schools are following to a greater extent than heretofore the requirements of the College Entrance Examination Board, it is recommended that the applicant to this school conform to the suggestions of this Board relative to English composition and literature.

The examination consists of two parts, both of which are given at the same time.

(a) With the object of testing the student's ability to express his thoughts in writing clearly and correctly he will be required to write upon subjects familiar to him. Emphasis will be laid upon the composition, punctuation, grammar, idiom and formation of paragraphs. He will be judged by how well he writes rather than by how much he writes.

(b) The second part of the examination is prepared with the view of ascertaining the extent of the student's knowledge of good literature, and to test this examination questions will be based on the books adopted by the National Conference on Uniform Entrance Requirements. Any course of equivalent amount if made up of standard works will be accepted.

History.—Applicants may offer a preparation of American history, English history, or medieval and modern history.

In American history applicants should be familiar with the early settlements in America, the colonies, their government, the customs of the people, and events which led to the establishment of the United States. They should be informed concerning the causes and effects of the principal wars in which the country has been involved. They should be prepared to consider also questions requiring an elementary knowledge of civil government, as well as historical facts connected with the growth of this country up to the present time.

For the subject of English history or medieval and modern history the course given in any reputable secondary school should give proper preparation. A course extending over a full year with not less than three periods a week will be accepted.

Physics.—The applicant should be familiar with the fundamental principles of physics, particularly those considered under the headings of mechanics, heat, light, electricity and magnetism. Textbook instruction should be supplemented by lecture table experiments. Wherever possible, the student should pursue a laboratory course, but for the present no applicant will be conditioned in this subject if he has not been able to carry on a laboratory course. Where a laboratory course is offered by a secondary school, it should cover at least twenty-five of those experiments listed in the syllabus of the College Entrance Examination Board.

Modern Languages.—Required for degree courses only. It is expected that the work in these subjects has covered a period of at least two years of preparatory school training or the equivalent. Importance should be given to the ability to translate into good idiomatic English, but attention should also be paid to grammar and construction, that greater care may be used in translation.

Elementary German A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple German prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into German.

The requirements include the declension of articles, adjectives, pronouns and nouns; the conjugation and inflection of weak and strong verbs; the simpler uses of the subjunctive; the use of the modal auxiliaries; the prepositions and their uses; the principal parts of important verbs; and the elementary rules of syntax and word order.

Texts used in the language courses of any reputable high or preparatory school will furnish reading for translation. A list of texts is offered by the College Entrance Examination Board.

Elementary French A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple French prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into French.

The requirements include the principal parts, conjugation and inflection of the regular and the more common irregular verbs; the singular and plural forms of nouns and adjectives; the uses of articles and partitive construction; the forms and positions of personal pronouns; and the simpler uses of the conditional and subjunctive.

Suitable texts are suggested by the language courses of any reputable high or preparatory school and by the requirements of the College Entrance Examination Board.

Students who have pursued two years of elementary French as well as two years of elementary German may present one subject to cover two points in the required subjects, and the other to cover two points in the elective subjects.

ELECTIVE SUBJECTS

History.—If the applicant can present all three or any two branches of history specified he may include one as a required subject and the others in the list of elective subjects.

Solid Geometry.—The usual theorems and constructions of good textbooks, including the relations of planes and lines in space, the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangles. The solution of original problems and the applications of the mensuration of surfaces and solids.

Trigonometry.—The usual courses of instruction covered by the standard textbooks on plane and spherical trigonometry will prepare an applicant sufficiently to meet this requirement.

Mechanical Drawing.—The applicant must have pursued such a course in mechanical drawing that he will be familiar with the usual geometrical construction problems, projection of points, lines, planes and simple solids.

Importance is laid not only upon the accuracy with which the work is performed, but upon the general arrangement, appearance and care with which the plates are executed.

It should not be understood that work in this subject may be offered as the equivalent of the first term's work at the Institute.

Mechanics Arts.—The usual courses offered by properly equipped preparatory schools will be accepted as suitable fulfilment of this requirement. Work should include instruction in the handling of both wood and metal working tools in the more simple practices of these arts.

Elementary French B.—Applicants who enter for one of the three-year courses may present one year's work in French in a secondary school. Those who present themselves for examination in this subject should be familiar with the rudiments of grammar, and be able to translate simple French prose into good idiomatic English, also to translate into French English sentences, based on the French given for translation.

Elementary German B.—Applicants who enter for one of the three-year courses may present one year's work in German in a secondary school. What is stated in regard to French applies to those who may present German instead of French.

Advanced French or German.—In cases where applicants have pursued courses in French or German for more than two years, and have completed work which is more advanced than is included under elementary French or German, they may offer the additional year as an elective.

Spanish.—Students offering Spanish should be familiar with elementary grammar, the common irregular verbs, and be able to translate simple Spanish to English or English to Spanish. A preparation equivalent to three periods per week for two years will be acceptable.

Latin.—Students who have pursued one or more years of Latin may present this subject as an elective. Each year's work satisfactorily completed will be considered equal to one point.

ADVANCED STANDING

Candidates who may have received previous training in any of the subjects scheduled in the regular course will, upon presentation of acceptable certificates, be given credit for such work.

COURSES OF INSTRUCTION

Degree Courses.—The four-year degree courses are as follows:

Textile Engineering.

Chemistry and Textile Coloring.

At the completion of these courses the degrees of Bachelor of Textile Engineering (B.T.E.) and Bachelor of Textile Chemistry (B.T.C.) are conferred.

Five options are offered in the Engineering Course, viz., general textile, cotton manufacturing, wool manufacturing, design, or sales option. Each of these courses is planned to train one in the fundamental principles of science found to be applicable in the particular fields of textile chemistry and textile engineering. It is maintained that for one to be successful in either of these important branches of industry a training is required as thorough and broad as that of any of the recognized branches of engineering or of applied science.

With this in mind these courses have been built of a secure framework of science and mathematics, and to it has been added the useful application of these branches in the broad textile field. With the direct purpose of laying a secure foundation in the training, a more extended preparatory course is first demanded, and subsequently in the school work more subjects of a general character are included, that narrowness of judgment and observation may not result by overstimulation of the technical development.

Diploma Courses.—The following courses extend over a period of three years and upon the completion of any one of these the diploma of the Institute is awarded:
 Cotton Manufacture.
 Wool Manufacture.
 Textile Design.

These are the original courses offered at the Institute, arranged to require three years' study and to give the student as thorough a training as possible for his chosen field, stressing particularly the study of textiles.

COURSES FOR WOMEN

Within the last few years the possibilities for women in certain branches of the textile field have become recognized and it is believed that in the future the positions open to them will become more and more numerous. Although all classes are open to women, the subject of textile design is especially interesting to some who choose the Textile Engineering Course with the design option, for it offers a broad training that prepares for many lines of activity. For those who wish to specialize in art and textile designing in their general application, courses will be arranged as far as the facilities of the Institute will permit. Some are interested in textile chemistry and pursue the Chemistry and Textile Coloring Course. These courses lead to positions either in mill offices or in some commercial lines which are desirable and offer congenial work.

GRADUATE COURSES

By act of the General Court of 1935, authority was given to the Lowell Textile Institute to confer degrees of Master of Science in Textile Chemistry and Master of Science in Textile Engineering to graduate students who satisfactorily complete courses of advanced standing.

The object of the courses is to offer to properly qualified graduates of the Institute who hold bachelor degrees an opportunity to pursue advanced courses in their respective department and to take work in other departments. It is also the object to offer to properly qualified graduates holding bachelor degrees of other institutions of higher learning an opportunity to carry on courses in textile education that will prepare them for entrance to that industry.

Graduates of this Institute will be required to devote at least one year residential study and graduates in general of other institutions at least two years residential study in order to receive the Master degree. Admission to advanced standing may be permitted where the applicant can present work which is approved by the department head as equivalent.

The tuition fees and deposits for graduate students are the same as those required for undergraduates. In general a graduate of this Institute shall devote approximately one third of his course to subjects of advanced character in his own department. One third of his course may be in subjects of his own or other departments not taken in undergraduate work and the remaining third of his course shall be occupied in a thesis of an advanced character and approved by the head of the department.

The courses of study for graduates of other colleges and technological institutions cannot be prescribed in detail for the reason that the selection must depend upon previous scholastic work and standing. They must include the essential subjects of textile education required in the particular department which the applicant elects and must receive the approval of the department head as well as the President and Faculty.

Students with proper preparation may be admitted to advanced courses but cannot be candidates for degrees unless they fulfill the above described requirements. All courses both undergraduate and graduate are open to women.

PHYSICAL EDUCATION AND ATHLETICS

Through competition in athletics and through instruction in classes in physical education the Department of Physical Education attempts to balance the intellectual and mental progress of the students by developing proper health habits, by promoting better physical development, and by inspiring high ideals of sportsmanship.

Physical education and athletics are under the supervision of the Head of the Physical Education Department, who is also Faculty Director of Athletics.

Physical Education

All members of the freshman class are required to take a course in physical training conducted in the gymnasium under the direction of an instructor in physical education. Two periods per week for the entire first year are devoted to this work. At the beginning of the year a full record is made of the physical examinations carried on by the instructor and a reputable physician that proper and beneficial exercise may be prescribed.

The object is to give general instruction in the care and strengthening of the body, and to so guide the students that they may continue to give proper thought to their physical training that their mental development may have its greatest effect.

Proper gymnasium clothing is required and all students must take a shower bath following each exercise.

Athletic Association

All students, by virtue of payment of the student athletic tax, are members of the Athletic Association and are represented by an executive council of sixteen, consisting of the president and athletic representative from each of the four classes, the captains and managers of the three varsity sports, and one representative each from the Pickout and the Textile Players. This Council acts as an advisory body to the Athletic Director, has charge of social and athletic events run by the Athletic Association, and ratifies the awarding of letters and appointment of student managers in the various sports.

The schedules of all sports are arranged with the interest of both the Institute and the individual members of the teams in mind. Admission to all home contests is included in the athletic fee which is paid by each student at the time of registration.

Teams are regularly maintained in varsity football, basketball, and baseball. Recently Textile has been represented by tennis and golf teams and by a junior varsity basketball team. Intramural competition is provided by interclass and interfraternity competition.

SUBJECTS OF INSTRUCTION

In the column headed "Hours of Exercise" the numbers represent for each particular subject the total hours required in school for a period of fifteen weeks.

The letter and number which follow the subjects indicate the department in which the subject is given and the number of the subject in that department. For detailed description of the same, see page 32.

The departments are indicated as follows:—

Textile Engineering	B	Cotton Yarns and Knitting . . .	F
Chemistry and Textile Coloring . .	C	Woolen and Worsted Yarns . . .	G
Textile Design and Power Weaving .	D	Finishing	H
Languages and History	E		

By referring to the letter and number indicated under "Preparation" the student can ascertain what subjects are necessary in order that he may have a clear understanding of the subject which he is scheduled to take.

FIRST YEAR

First Term

(Common to all Courses)

	Hours of Exercise
Elementary Inorganic Chemistry C-10	105
English E-10	45
Mathematics B-10	60
Mechanical Drawing B-13	135
Physics B-11	75
Physical Education	30
Textile Design and Cloth Analysis D-10	75

Second Term

	Course IV	Course VI
Elementary Inorganic Chemistry C-10	30	30
Elementary Organic Chemistry C-11	45	45
Elementary German E-11	30	—
English E-10	45	45
Machine Drawing B-13 or B-13a	45	135
Mathematics B-10	60	60
Mechanism B-12	60	60
Physical Education	30	30
Qualitative Analysis C-12 or C-12a	150	45
Stoichiometry C-13	30	—
Textile Design and Cloth Analysis D-10	—	75

For second-term subjects in Courses I, II, and III, see pages 19, 21, 23.

Course I.—Cotton Manufacture

The Cotton Manufacturing Course is intended for students contemplating a career in the manufacture of yarns or fabrics of cotton or the new synthetics processed after the methods used for cotton. As over eighty per cent of the textile fibers consumed in the United States is cotton, it is the policy of the Cotton Department to give the student a thorough course of instruction in handling cotton first. Later, the adaptation of cotton machinery to handle rayon, wool or other fibers is carefully covered. Throughout the work on cotton carding and spinning, reference is made to the possibilities of handling the various rayons, wools or mixes and usually one or more small lots are processed in the laboratory.

During the first term the studies are common to all courses, and include instruction in mathematics, mechanical drawing, physics, textile design and elementary chemistry.

During the second term, lectures in organic chemistry are given followed by lectures in textile chemistry and dyeing the second year. The work in mechanism serves as a basis for all future machine and mechanical work, and is followed by steam engineering, electricity and mill engineering. The course in textile designing, cloth analysis and cloth construction includes lectures on plain, fancy and Jacquard weaves, the analysis of all commercial fabrics, and designs for the same.

The instruction in cotton carding given in the second year covers the production of cotton throughout the world, the classing of various cottons and the various methods of marketing the cotton crop with particular emphasis given to the American cotton crop. The treatment of cotton in the mill processes covers all the operations preparatory to spinning, for the regular cotton system and for the cotton waste systems. Lectures supplement the material available in specially prepared text books. This makes possible instruction regarding the very newest developments in the industry as well as for standard methods and equipment. Considerable time is spent in the laboratory studying cotton fibers, classing, processing stock and making various tests on the adjustment of machines and the effect on the quality of the work produced.

The third year's work continues that of the second year, with detailed study of spinning, spooling, twisting and winding. Another course gives instruction in mill organization, balancing and arranging machinery in the mill. Finally, a brief course is given in the use of the microscope and camera in studying various problems in cotton manufacture. Laboratory practice supplements the lecture course, giving practical operation, adjustment and observation of the machines studied. Advanced laboratory work illustrates the methods of study and analysis of the more general and complex problems such as are usually handled in the laboratory of a textile plant.

Power weaving is taken up during the second and third years. Commencing with lectures and practice upon plain looms, the instruction continues with dobby, box-loom, and Jacquard weaving.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines. Instruction in the finishing of cotton fabrics is given by lectures and laboratory work, and requires considerable work on standard machines in the laboratory. Textile testing, also given in the third year, instructs the student in standard methods for physical testing of textile material.

During both the second and third years, particular attention is given to the preparation of the various reports in order that the student may learn proper methods for presenting data and conclusions resulting from mill studies and tests.

During the third year, each student makes some original study, usually of a technical nature. He must make a formal report of this study satisfactory to the faculty before receiving his diploma.

For detailed description of the subjects see page 32.

Course I.—Cotton Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	30
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	135	Textile Design and Cloth Analysis D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Color D-33	15	Steam Engineering B-24*	45
Cotton Carding F-20	210	Textile Chemistry and Dyeing Lect. C-20	30
Cottons F-22	15	Textile Design and Cloth Construction D-20	90
Physics B-23a	45		
Power Weaving D-24	75		

SECOND YEAR. SECOND TERM

Cotton Carding F-21	195	Textile Chemistry and Dyeing Lect. C-20	30
Cotton Waste Processing F-23	30	Textile Design and Cloth Construction D-20	75
Physics B-23a	45		
Power Weaving D-24	150		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Mill Engineering B-34a*	30
Cotton Organization F-34	60	Power Weaving D-32	165
Cotton Quality Control F-32	15	Staple Fiber Manufacture F-33	15
Cotton Spinning F-30	135	Textile Testing B-43a	30
Electricity B-31a*	30	Thesis F-35.	

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Power Weaving D-32	120
Cotton Winding and Twisting F-31	225	Thesis F-35.	
Knitting FK-30	105		

* Not given in 1943-44.

Course II.—Wool Manufacture

The course on wool manufacturing is arranged for those who contemplate a career in the manufacture of woolen or worsted fabrics, and can devote but three years to the school work. It includes instruction on all of the varied processes employed in manipulating the wool fiber to produce yarn and cloth, namely, sorting, scouring, carding, combing, spinning, designing, weaving, dyeing and finishing. The work is carried on by lectures, recitations and practical work in the laboratories.

Beginning with the second year the details of manipulating wool from the grease to the finished yarn is taken up for close study. This includes the spinning of woolen yarn, also worsted yarn, by both the English and the French systems. The intermediate processes of sorting, scouring, carding, combing and top-manufacturing are taken in detail and in proper sequence. Instruction in the production and manipulation of re-worked wool is also included.

The general chemistry of the first year is followed by a lecture course in the second year on textile chemistry and dyeing.

Textile design, cloth analysis and construction are continued from the first year throughout the course, the work being applied especially to woolen and worsted goods. Weaving on power looms commences in the second year and continues through the third.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines.

Lectures on finishing commence with the third year and are augmented by extensive practice with the machines in the Finishing Department.

Work in the Engineering Department extends throughout all three years, and includes mechanical drawing, steam engineering and electricity. The practical application of the principles studied in these subjects is brought out forcibly in the work on mill engineering, where mill design and construction are considered. A short course covering methods employed in the testing of fibers, yarns, and cloths, together with laboratory work in the manipulation of certain physical apparatus, is given in the third year.

For detailed description of the subjects see page 32.

Course II.—Wool Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry		Mechanism B-12	60
C-10	30	Physical Education	30
Elementary Organic Chemistry C-11	45	Qualitative Analysis C-12a	45
English E-10	45	Textile Design and Cloth Analysis	
Machine Drawing B-13	135	D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Fiber Preparation G-20-21	240	Textile Chemistry and Dyeing	
Physics B-23a	45	Lect. C-20	30
Power Weaving D-24	90	Textile Design and Cloth Construc-	
Steam Engineering B-24*	45	tion D-21	75

SECOND YEAR. SECOND TERM

Color D-33	15	Textile Chemistry and Dyeing	
Fiber Preparation G-20-21	240	Lect. C-20	30
Physics B-23a	45	Textile Design and Cloth Construc-	
Power Weaving D-24	120	tion D-21	75

THIRD YEAR. FIRST TERM

Electricity B-31a*	30	Textile Testing B-43a	30
Knitting FK-30	105	Woolen and Worsted Finishing	
Mill Engineering B-34a*	30	H-30	75
Power Weaving D-32	45	Worsted Yarn Manufacture G-30	240

THIRD YEAR. SECOND TERM

Power Weaving D-32	195	Worsted Yarn Manufacture G-30	255
Woolen and Worsted Finishing		Thesis.	
H-30	75		

* Not given in 1943-44.

Course III.—Textile Design

The general course in textile design is planned to meet the demand of young men for a technical training in the general processes of textile manufacturing, but with particular reference to the design and construction of fabrics. To this end a foundation is laid in the first year by instruction in the elementary principles of designing, decorative art and weaving. That he may later in the course pursue to advantage instruction in yarn manufacturing, weaving, dyeing, finishing and some engineering problems, a foundation course in mechanics, mathematics and chemistry is laid. As the student is required to pursue courses in the yarn departments, both cotton and wool, he acquires a knowledge of the manufacture of cotton yarns from the bale to the yarn, and of woolen and worsted yarns from the fleece through the varied processes of manufacturing woolen yarn or worsted yarn by both the French and Bradford systems.

Throughout his entire course he receives instruction in design, cloth analysis and construction of all the standard cloths, viz., trouserings, coatings, suitings, blankets, velvets, corduroys, plushes, etc. This is followed by advanced work in Jacquard designing and weaving, which serves not only to acquaint the student with the many kinds of cotton, woolen, worsted and silk fabrics of figured design, but stimulates and develops any artistic talent he may possess. Decorative art becomes an important part of the work of the second and third years.

The courses of freehand drawing, perspective, historic ornament and color serve as means in applying the instruction received in principles of design and textile styling to a better understanding of fashion trends and the changing designs that follow these. The actual pattern drafting and making of garments may be developed to a limited extent as time and individual skill permits.

The course in general inorganic and organic chemistry of the first year leads to the subject of textile chemistry and dyeing in the second year.

Power weaving commences with the second year and continues throughout the course, and work on all types of looms is required.

During the third year the student receives instruction in the finishing of cotton goods and woolen and worsted cloths. This instruction is given by means of lecture and laboratory work.

The engineering subjects given in the second and third years are intended to acquaint the student with such general knowledge as will be of assistance should he be called upon in later life to be a mill manager, or should his subsequent progress lead to some executive position in the operation of a textile plant.

For detailed description of the subjects see page 32.

Course III.—Textile Design

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	30
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	135	Textile Design and Cloth Analysis D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Cotton Carding F-20b	90	Steam Engineering B-24*	45
Color D-33	30	Textile Chemistry and Dyeing Lect. C-20	30
Perspective D-25	45	Textile Design and Cloth Construction D-20, 21	165
Physics B-23a	45		
Power Weaving D-24	90		

SECOND YEAR. SECOND TERM

Cotton Carding F-21b	60	Principals of Design D-34	45
Color D-33	45	Textile Chemistry and Dyeing Lect. C-20	30
Fiber Preparation G-20-21.	90	Textile Design and Cloth Construction D-20, 21	105
Physics B-23a	45		
Power Weaving D-24	105		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Textile Testing B-43a	30
Cotton Spinning F-30b	60	Woolen and Worsted Finishing H-30	75
Power Weaving D-32	60	Worsted Yarn Manufacture G-30.	90
Textile Design and Cloth Construction D-30	135		

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Textile Design and Cloth Construction D-30	75
Cotton Winding and Twisting F-31b	60	Woolen and Worsted Finishing H-30	75
Jacquard Design D-23	30	Worsted Yarn Manufacture G-30.	90
Power Weaving D-32	120	Thesis.	

* Not given in 1943-44.

Course IV.—Chemistry and Textile Coloring

The four-year course in Chemistry and Textile Coloring, leading to the degree of B.T.C., is especially intended for those who wish to engage in any branch of textile chemistry, textile coloring, bleaching, finishing or the manufacture and sale of the dyestuffs or chemicals used in the textile industry. The theory and practice of all branches of dyeing, printing, bleaching, scouring and finishing are taught by lecture work supplemented by a large amount of experimental laboratory work and actual practice in the dyehouse and finishing room.

The underlying theories and principles of chemistry are the same, no matter to what industry the application is eventually made. Furthermore, no industry involves more advanced and varied applications of the science of chemistry than those of the manufacture and application of the coal-tar coloring matters. In addition, the textile colorist must consider the complex composition of the textile fibers, and the obscure reactions which take place between them and the other materials of the textile industry.

During the first year general chemistry, including both inorganic and organic, is taught by lectures and laboratory work, and this is supplemented during the second term by qualitative analysis and stoichiometry.

Advanced inorganic chemistry, as well as advanced organic chemistry, is studied during the second and third year as a continuation of the elementary chemistry of the first year, and much time is spent upon quantitative analysis, industrial chemistry, and textile chemistry and dyeing.

The foundation work in general chemistry is continued during the third year with courses in physical chemistry, organic laboratory work and analytical work. The subject of industrial chemistry is introduced, and much time is devoted to advanced textile chemistry, dye testing, color matching, calico printing, and woolen, worsted and cotton finishing.

The fourth year is characterized by an endeavor to present certain subjects of a more applied nature in such a manner that the student's reasoning power and ability to apply the knowledge gained during the first three years may be developed to the fullest extent. The subject of engineering chemistry is introduced, and the work in the dyeing and analytical laboratories is applied as far as possible to the actual requirements of the factory chemist and colorist. Much time is also spent in the organic chemistry laboratory, particular attention being given to the preparation of typical dyestuffs. Thorough courses are given in microscopy, photomicrography and the use of various instruments such as the spectroscope, ultra-microscope, polariscope, tintometer and other optical instruments applicable to experimental work in connection with the textile industry. Courses are also given in report writing and textile literature.

During this fourth year the student has an opportunity to take several elective subjects of an advanced nature and conduct such research work and original investigation as time may permit.

For detailed description of the subjects see page 32.

Course IV.—Chemistry and Textile Coloring

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Advanced German E-21	45	Quantitative Analysis C-23	130
Organic Chemistry C-22	30	Stoichiometry C-24	15
English E-20	30	Textile Chemistry and Dyeing Lab. C-21	90
Mathematics B-20a	60	Textile Chemistry and Dyeing Lect. C-20	45
Physics B-23	65		
Power Weaving D-24a	15		

SECOND YEAR. SECOND TERM

Advanced German E-21	45	Stoichiometry C-24	15
Organic Chemistry C-22	30	Textile Chemistry and Dyeing Lab. C-21	120
English E-20	30	Textile Chemistry and Dyeing Lect. C-20	45
Physics B-23	67		
Quantitative Analysis C-23	173		

THIRD YEAR. FIRST TERM

Organic Chemistry C-34	15	Physical Chemistry C-33	45
Adv. Textile Chemistry and Dye- ing Lab. C-32	135	Quantitative Analysis C-30	150
Adv. Textile Chemistry and Dye- ing Lect. C-32	30	Technical German C-35	30
Economics E-30	45	Woolen and Worsted Finishing H-30	75

THIRD YEAR. SECOND TERM

Adv. Textile Chemistry and Dye- ing Lab. C-32	135	Organic Laboratory C-36	45
Adv. Textile Chemistry and Dye- ing Lect. C-32	15	Physical Chemistry C-33	45
Economics E-30	45	Quantitative Analysis C-30	105
Industrial Chemistry C-31	30	Technical German C-35	30
		Woolen and Worsted Finishing H-30	75

FOURTH YEAR. FIRST TERM

Adv. Textile Chemistry and Dye- ing Lab. C-44	90	Microscopy and Photomicroscopy C-45	60
Adv. Textile Chemistry and Dye- ing Lect. C-44	30	Electives or Thesis C-53	90
Chemical Textile Testing C-43	75	Organic Laboratory C-41	75
Colloid Chemistry C-50	30	Quantitative Analysis C-46	15
Industrial Chemistry C-42	30	Report Writing C-47	15
		Seminar in Business English E-40	15
		Textile Marketing B-42*	30

FOURTH YEAR. SECOND TERM

Advanced General Chemistry C-49	30	Electives or Thesis C-53	90
Adv. Textile Chemistry and Dye- ing Lab. C-44	135	Organic Laboratory C-41	105
Adv. Textile Chemistry and Dye- ing Lect. C-44	15	Rayon Manufacturing C-51	15
Chemical Engineering C-52	45	Technology of Wool Fibers G-40	15
Chemical Textile Testing C-43	45	Textile Literature C-48*	30

* Not given in 1943-44.

Course VI.—Textile Engineering

This course is the four-year general textile course leading to the degree of Bachelor of Textile Engineering (B.T.E.), and aims especially to fit men, in the broadest possible manner, to meet the increasing demands of every branch of the textile industry for men with combined textile and technical preparation. The magnitude and scope of the textile and allied industries fully justify the most thorough technical training possible for all who aspire to leadership in this field.

The course is planned so as to provide a foundation in those subjects which are essential to the training of an engineer, coupled with a thorough understanding of textile processes and materials. Such subjects as mathematics, physics, chemistry, drawing, mechanics and mechanism, provide for the first objective. The second is secured by a study of cotton, woolen and worsted yarn manufacturing, textile designing, weaving, knitting, dyeing, and finishing. Instruction is by means of lectures, recitations and laboratory work.

A large proportion of the student's time is spent in well equipped textile departments where he is familiarized with the machinery and processes used in the conversion of cotton and wool fibers into yarns and finished fabrics. The subjects of textile testing and microscopy acquaints the student with the methods for determining the physical properties of textile fibers, yarns and fabrics.

To properly equip the student to meet the varied engineering problems which confront the mill manager or executive, or to so train him that he may enter those industries closely allied to the textile, instruction is given by lecture and laboratory practice in the several branches of engineering. Steam engineering considers the problems involved in steam generation and distribution for power, heating and manufacturing purposes, and includes the testing of laboratory and power plant equipment. The course in electrical engineering treats of the generation and transmission of electrical power, the testing of direct and alternating current machinery, and is intended to acquaint the student with modern practice. Mill engineering familiarizes the student with factory design, construction, heating, lighting, humidification, fire protection, and the arrangement of machinery and buildings for most efficient production and economical power distribution.

The broadening effect of such subjects as English and economics is carried still further in this course by carefully planned courses in business administration, accounting, cost accounting and business law.

During the fourth year the student is required to conduct an original investigation of some textile or allied problem, and to submit the results in the form of a satisfactory thesis before receiving his degree.

The Cotton and Wool Options of the Textile Engineering course have been provided for those students who may desire the breadth of technical training which this course offers but who wish to specialize in either cotton or wool manufacturing. In these optional courses the student's entire time is devoted to the study of that particular fiber which he elects. A demand from the distributing and marketing divisions of the textile industry for properly trained men has led to the establishment of the Sales Option of the Textile Engineering course. This is patterned after the General Course but with more time devoted to such subjects as selling, advertising, marketing, foreign trade and the like. There have also been requests for a four-year degree course in which the design of textile materials should receive the greater emphasis. For this purpose the Design Option of the Textile Engineering course is offered, which, while majoring in textile design, includes other subjects that make a broader course than the one of shorter duration.

In the General Option some recognition is given to those who may wish to lay more emphasis on knit fabrics. This is done by the substitution of knitting laboratory time for a portion of that assigned to weaving laboratory and is dependent on the possibility of arranging for such special cases.

For detailed description of subjects, see page 32. The curricula of the several optional courses will be found on pages 27 to 31.

Course VI.—Textile Engineering (General Course-G)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20b	75	Physics B-23	75
Fiber Preparation G-20, 21	120	Textile Chemistry and Dyeing	
Machine Drawing B-21.	45	Lecture C-20	30
Machine Shop B-26	75	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-22	45

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Mathematics B-20	60
Cotton Carding F-21b	75	Physics B-23	75
Electives F-25		Power Weaving D-24	75
Fiber Preparation G-20, 21	90	Textile Chemistry and Dyeing	
Machine Drawing B-21.	75	Lect. C-20	30

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Spinning F-30b	60	Power Weaving D-32	60
Economics E-30	45	Worsted Yarn Manufacture G-30.	90
Electives F-35		Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Mill Engineering B-34*	90
F-31b	60	Worsted Yarn Manufacture G-30.	90
Economics E-30	45	Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75
Heat Engineering B-33	90		

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42*	30
Cotton Organization F-34	60	Textile Microscopy B-41	60
Cotton Laboratory F-40	45	Textile Testing B-43	75
Electrical Engineering B-44	75	Thesis	
Mill Engineering B-45	75		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Knitting FK-30a	105
Cotton Finishing H-31	105	Mill Engineering B-45	75
Electives B-48 or F-45		Mill Illumination B-47*	45
Electrical Engineering B-44	75	Thesis	

* Not given in 1943-4

Course VI.—Textile Engineering (Cotton Option-C)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20a	165	Textile Chemistry and Dyeing	
Cottons F-22	15	Lecture C-20	30
Machine Drawing B-21.	90	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-20	90
Physics B-23	75		

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Power Weaving D-24	60
Cotton Carding F-21a	105	Textile Chemistry and Dyeing	
Cotton Waste Processing F-23	30	Lect. C-20.	30
Machine Drawing B-21	45	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-20	75
Physics B-23	75		

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Quality Control F-32	15	Machine Shop B-26	45
Cotton Spinning F-30a	150	Power Weaving D-32	60
Economics E-30	45	Staple Fiber Manufacture F-33	15
Electrical Engineering B-31	75		

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Heat Engineering B-33	90
F-31a	180	Mill Engineering B-34*	90
Economics E-30	45	Power Weaving D-32	45
Electrical Engineering B-31	75		

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42*	30
Cotton Organization F-34	60	Textile Microscopy B-41	60
Cotton Laboratory F-40	45	Textile Testing B-43	75
Electrical Engineering B-44	75	Thesis	
Mill Engineering B-45	75		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Mill Engineering B-45	75
Cotton Finishing H-31	105	Mill Illumination B-47*	45
Electrical Engineering B-44	75	Thesis	
Knitting FK-30	105		

* Not given in 1943-44.

Course VI.—Textile Engineering (Wool Option-W)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Fiber Preparation G-20, 21	225	Mathematics B-20	60
Machine Drawing B-21	90	Physics B-23	75
Machine Shop B-26	45	Textile Chemistry and Dyeing Lecture C-20	30

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Physics B-23	75
Fiber Preparation G-20, 21	195	Power Weaving D-24	75
Machine Drawing B-21	45	Textile Chemistry and Dyeing Lect. C-20	30
Mathematics B-20	60		

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Power Weaving D-32	60
Economics E-30	45	Woolen and Worsted Finishing H-30	75
Electrical Engineering B-31	75	Worsted Yarn Manufacture G-30 .	150
Heat Engineering B-32	75		

THIRD YEAR. SECOND TERM

Economics E-30	45	Woolen and Worsted Finishing H-30	75
Electrical Engineering B-31	75	Worsted Yarn Manufacture G-30 .	150
Heat Engineering B-33	90		
Mill Engineering B-34*	90		

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42*	30
Electrical Engineering B-44	75	Textile Microscopy B-41	60
Mill Engineering B-45	30	Textile Testing B-43	75
Textile Design and Cloth Construc- tion D-21	75	Thesis	

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Mill Illumination B-47*	45
Electrical Engineering B-44	75	Textile Design and Cloth Construc- tion D-21	75
Knitting FK-30	105	Thesis	
Mill Engineering B-45	75		

* Not given in 1943-44.

Course VI.—Textile Engineering (Design Option-D)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20c	60	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	90	Lecture C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Perspective D-25.	45	tion D-20, 21	165
Physics B-23	75		

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Power Weaving D-24	60
Fiber Preparation G-20, 21	90	Textile Chemistry and Dyeing	
Mathematics B-20	60	Lect. C-20	30
Physics B-23	75	Textile Design and Cloth Construc-	
Knitting FK-21	30	tion D-20, 21	120

THIRD YEAR. FIRST TERM

Color D-33	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30	105
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Knitting FK-31	45	Woolen and Worsted Finishing	
Power Weaving D-32	75	H-30	75

THIRD YEAR. SECOND TERM

Color D-33	45	Textile Design and Cloth Construc-	
Cotton Winding and Twisting F-31b	60	tion D-30	75
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Power Weaving D-32	105	Woolen and Worsted Finishing	
Principles of Design D-34	30	H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40.	45	Textile Microscopy B-41	60
Jacquard Design and Weaving D-40	90	Textile Styling B-50	30
Textile Design and Cloth Construc-		Textile Testing B-43	75
tion D-41	75	Thesis	
Textile Marketing B-42*	30		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Perspective D-25	45
Cotton Finishing H-31	105	Textile Design and Cloth Construc-	
Jacquard Design and Weaving D-40	120	tion D-41	90
Machine Shop Practice B-26	45	Thesis	

* Not given in 1943-44.

Course VI.—Textile Engineering (Sales Option-S*)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Cotton Carding F-20b	75	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	105	Lecture C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	180

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	90	Lect. C-20	30
Mathematics B-20	60	Textile Design and Cloth Construc-	
Physics B-23	75	tion D-20, 21	105
Power Weaving D-24	105		

THIRD YEAR. FIRST TERM

Color D-33	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30	105
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Power Weaving D-32	75	Woolen and Worsted Finishing	
Principles of Marketing B-35	45	H-30	75

THIRD YEAR. SECOND TERM

Color D-33	45	Statistics B-53	45
Cotton Winding and Twisting		Textile Design and Cloth Construc-	
F-31b	60	tion D-30	75
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Marketing Methods B-36	60	Woolen and Worsted Finishing	
Power Weaving D-32	30	H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Design D-41	75
Principles of Selling and Advertis-		Textile Microscopy B-41	45
ing B-49	105	Textile Styling B-50	30
Selling Policies B-52	45	Textile Testing B-43	75
Jacquard Design and Weaving		Thesis	
D-40	45		

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Perspective D-25	45
Cotton Finishing H-31	90	Selling Policies B-52	45
Foreign Trade and Economic Geog-		Spherical Trigonometry and Navi-	
raphy B-51	45	gation	45
Knitting FK-30b	75	Thesis	
Machine Shop Practice B-26	45		

* Not given in 1943-44.

SUBJECTS OF INSTRUCTION

TEXTILE ENGINEERING DEPARTMENT—B

The various options are designated by G, C, W, D, S.

*The subjects listed for the Sales Option will be discontinued for the duration of the war.

Mathematics—B-10. Preparation: Admission Requirements. The work in the first term consists of algebra, plane trigonometry, and instruction in the use of the slide-rule. Algebra is reviewed through quadratics and then logarithms are taken. In plane trigonometry, right and oblique triangles are solved by means of natural and logarithmic functions, and the various algebraic relations among the trigonometric functions are proved and used in identities and equations. Significant figures and the use of approximate data in calculations are also discussed.

In the second term the following topics are taken up: spherical trigonometry and application to navigation, graphical and mathematical solution of quadratic and simultaneous equations, theory of equations, partial fractions, Napierian logarithms, equations of the straight line, equations of various curves, differentiation and integration of algebraic functions, and applications. [All courses.]

Physics—B-11. Preparation: Admission Requirements. Taken simultaneously with B-10. This subject is required as a necessary preparation for all courses, and is given during the first term of the first year. The fundamental principles of this subject are considered absolutely essential to a thorough understanding of the operation of all machinery, textile or otherwise. Some of the topics treated in this course are linear and angular velocity, uniform and accelerated motion, mass, momentum, inertia, effect of force in producing motion, centrifugal force, work, power, energy, principle of moments and its applications, parallelogram and triangle of forces with applications, resolution and composition of forces, the mechanical principles represented by the wheel and axle, differential pulley block, common pulley blocks, jackscrew, worm and wheel, inclined plane, hydrostatics, elements of hydraulics, kinetic energy, circular motion and harmonic motion.

LABORATORY. This course is supplementary to the lecture course and gives the student an opportunity to apply the knowledge gained in the lecture course by performing various experiments. [All courses.]

Mechanism—B-12. Preparation: B-10 and B-11. This subject is also deemed to be one of those absolutely essential to every student's preparation for the work of the following years. Whereas the principles studied are of general application, textile machinery in particular furnishes an unusually large variety of specific examples, and frequent reference is made to these in the development of the course. Some of the important topics covered are gearing and gear train design, belting and pulley calculations, cone and stepped pulley design, cam design, linkages, epicyclic gear trains, and intermittent motion devices. [All courses.]

Mechanical Drawing—B-13. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is taken during the first year and consists of work in the drawing room supplemented by lectures. This subject is considered of the greatest importance as a preparation for the student's future work, and the practical usefulness of drawing of this character is fully emphasized.

This course is systematically laid out covering in order the following divisions:—care and use of drawing instruments; lettering; geometrical constructions; orthographic projection; isometric projection; cross sections; dimensioning; sketching practice on machine details; working drawings; tracing and blueprinting; developments with practical application. [Courses I, II, III, VI.]

Machine Drawing—B-13a. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is similar to B-13, but not so extensive, and is given to students electing the Chemistry and Textile Coloring course. [Course IV.]

Mathematics—B-20. Preparation: B-10. This subject is a continuation of the first year subject B-10, and extends throughout the second year of the engineering course. In the first term the following topics are treated:—exponential functions, the circle, parabola, ellipse, hyperbola, polar coördinates, indefinite

integrals, summation by integration and applications of integration. In the second term the topics are: differentiation of transcendental functions, methods of integration, centers of gravity, moments of inertia, empirical formulas, nomographic charts, and spherical trigonometry and applications. [Course VI.]

Mathematics—B-20a. Preparation: B-10. This subject is a continuation of the work of the first-year subject B-10. A study of the derivatives and differentials is followed by applications of the differential to rates and errors. Other topics treated are the circle, parabola, ellipse, hyperbola, indefinite integrals, summation by integration, areas, volumes, pressures, exponential, logarithmic, trigonometric functions, and spherical trigonometry. [Course IV.]

Machine Drawing—B-21. Preparation: B-10, B-12, B-13. The work in Machine Drawing is devoted to working detail drawings of textile machinery and advanced graphical mechanism problems. In every case the data for all of these problems are taken directly from some of the textile machines that the students use in other departments. [Course VI, Options G, C, W.]

Physics—B-23. Preparation: B-10 and B-11. This subject lays the foundation for later work in engineering and chemistry and also explains the general application of the laws and principles of physics. Instruction, consisting of lectures, demonstrations, and recitations, is given for three hours per week during the second year. The topics taken up the first term are:—wave motion and sound, thermometry, measurement of heat, change of state, expansion, transfer of heat, humidity, elements of meteorology, nature and propagation of light, and photometry.

The second term is devoted to the study of light, magnetism, and electricity. Some of the topics are:—reflection and refraction, lenses, the telescope and microscope, the spectroscope, color sensation, double refraction, magnetism, electrostatics, fundamental laws of direct currents and electrolysis, electronics.

LABORATORY. A two-hour period per week for Course VI and a three-hour period every alternate week for Course IV accompanies the class work in this subject and is planned to illustrate precise methods for measuring various physical quantities. [Courses IV, VI.]

Physics—B-23a. Preparation: B-10 and B-11. This subject consists of the same topics as B-23 but does not contain any laboratory work. [Courses I, II, III.]

Steam Engineering—B-24. Preparation: B-12. This course consists of thirty lectures given in the first term of the second year. Its aim is to give those students who do not take the Textile Engineering Course a general knowledge of thermodynamics, the steam engine, steam turbine and gas engine and their auxiliaries, and waste heat reclamation. [Courses I, II, III.]

Applied Mechanics—B-25. Preparation: B-11, B-20. This course is divided into two parts: Graphic Statics and Strength of Materials. The first eight weeks of the semester which is devoted to Graphic Statics consists of the study of mathematical and graphical solutions for any system of forces. Centers of gravity and funicular polygons are introduced followed by roof and bridge truss problems under various conditions of dead, live, wind, and snow loading.

During the second half of the semester and during all the following semester, this course deals with Strength of Materials. So far as time permits, such topics as stress, strain, methods of testing materials, bending moments, shearing force, beam design, torsion, design of shafts, compound beams and columns, combined stresses, and like subjects are considered.

This subject is preparatory to the work in Mill Engineering of both the third and fourth years, at which time its practical value and application are clearly demonstrated. [Course VI, Options G, C, W.]

Machine Shop Practice—B-26. Preparation: B-11 and B-12. Systematic instruction is given in the most approved methods of machine shop practice, the object being to familiarize the student with the proper use of hand and machine tools, and the characteristics of the different materials worked. Particular attention is given to the form, setting, grinding and tempering of tools and the mechanism of the different machines involving certain speeds, feeds, etc. The course is so planned that the instruction in each typical operation shall conform as nearly as

possible to commercial machine-shop practice on textile machinery. The list of tools which appears under "Equipment" in this Bulletin gives an idea of the scope of the work, which includes chipping and filing, tool grinding and tempering, straight and taper turning, screw cutting, drilling and boring, planer work, milling machine work, including gear cutting. [Course VI, Options G, C, W.]

Applied Mechanics—B-30. Preparation: B-25. This is a continuation of Applied Mechanics B-25, and is given during the first term of the third year. [Course VI, Options G, C, W.]

Electrical Engineering—B-31. Preparation: B-23. The elementary principles of electricity and magnetism are considered in the lecture course on physics. Their development and application are taken up in this course in a detailed study of the magnetic and electric circuits during the first period of the first term. The second period is devoted to a study of the principles of direct current machinery. The laboratory work consists of a study of technical electrical measurements and dynamo-electric machinery, determining for the latter their operating characteristics.

The second term is devoted entirely to a study of the principles of alternating current circuits, including vector representation, effective values, power, series and parallel circuits. The laboratory work consists of a study of technical electrical measurements, some meter calibration including that of watt-hour meters and a study of alternating current circuits using electrical measuring instruments. [Course VI, Options G, C, W.]

Electricity—B-31a. Preparation: B-23a. This is a short course given in the third year of the manufacturing courses, and consists of thirty lectures covering briefly and in a general way the theory of direct and alternating current generators and motors. [Courses I, II.]

Heat Engineering—B-32. Preparation: B-12, B-20. The purpose of this course is to familiarize the student with the principles of elementary thermodynamics, the properties of steam, mechanical mixtures and combustion of fuels. The course consists of thirty exercises given in the first term of the third year. The lectures and recitations are supplemented with illustrative problems assigned for home preparation.

LABORATORY. The principles underlying the subjects of steam engineering, hydraulics and thermodynamics are demonstrated in a practical manner in the work in the Engineering Laboratory, given three hours per week. Greater importance is attached to the development of initiative and responsibility in the student than the mere accomplishment of a large number of carefully planned tests. The character of this work is indicated by the following list of experiments and tests:—

Calibration of scales, tanks, gauges, inductors and counters; barrel, separating and throttling calorimeter tests; heat exchange tests; boiler inspection and measurement; flue gas analysis; dynamometer tests; ejector and injector tests; Rankin's efficiency, actual thermal efficiency and duty tests; expansion of pipes, radiation and pipe covering tests; boiler test; trap tests, feed water heating tests; steam, triplex and centrifugal pump tests. [Course VI, Options G, C, W.]

Heat Engineering—B-33. Preparation: B-32. This course is a continuation of B-32, and consists of forty-five hours of lectures and recitations given in the second term of the third year of the Textile Engineering course. The subjects developed are the kinematics of reciprocating steam engines, steam turbines and gas engines. Special attention is given to the mechanical principles on which the steam engine operates, with detail discussion of the valve gear and governing devices, and the various diagrams used for studying the same. Consideration is given to the underlying heat theory and to the details of construction of the various parts of the machines. During the latter part of the course the historical development, classification and types of turbines and gas engines are discussed.

LABORATORY. The character of the work in the Engineering Laboratory, given three hours per week during the second half of the third year, is indicated by the following list of experiments:—

Boiler inspection and measurement; Rankin's efficiency, actual thermal efficiency and duty tests; boiler test; valve setting by measurement and by indicator;

condenser test; non-condensing and condensing engine and turbine tests; heating and ventilating fan tests; lap and butt riveted joint test; nozzle test; gas engine test; flow of air and air compressor tests. [Course VI, Options G, C, W.]

Mill Engineering—B-34. Preparation: B-21, B-25. Mill Engineering, as presented in thirty lectures during the third year of the Textile Engineering course, consists of a discussion of the following topics: the investigation of the subsoils for the footing course of the foundation; building materials; design of walls, beams, floors, and construction of windows, doors, stairways and roofs.

Sixty hours of drawing-room and laboratory practice are devoted to plane surveying, contour plotting, cut and fill calculations, setting of batter boards, alignments of shafting and the study from blue-prints of slow-burning construction. [Course VI, Options G, C, W.]

Mill Engineering—B-34a. Preparation: B-21. Mill Engineering, as presented in thirty lectures during the third year of the diploma courses, is largely general in its nature and includes only parts of Course B-34. [Courses I, II.]

***Principles of Marketing—B-35.** An introduction to the basic principles underlying the modern systems of distributing goods with special emphasis on the raw and finished products of the textile industry. The course will cover the history and economic importance and functions in modern distribution of the selling agent, the commission man, the broker, jobber, merchant, factor and other intermediaries as well as the channels that goods may take from the producer to the ultimate consumer. The importance and advantages of each will be studied with special emphasis on the present practice and trends in the textile industry.

Lectures and the case method of instruction will be employed. [Course VI, Sales Option.]

***Marketing Methods—B-36. Preparation: B-35.** A continuation of the Principles of Marketing. The course will be conducted by means of lectures and case problems and discussions. Some of the subjects studied in detail are,—the planning of marketing campaigns, the fluctuations of price and style, forecasting, the business cycle, quotas, market surveys and research, sales planning and control, industrial marketing, and consumer merchandising.

Considerable time will be devoted to the study of current literature and events in the textile field. [Course VI, Sales Option.]

Accounting—B-40. Preparation: B-10 and E-30. The purpose of this course is to acquaint the student with the principles and modern methods of accounting for mercantile and manufacturing businesses. It is not intended to make him a proficient bookkeeper or accountant, but the nature of the subject necessitates a basic knowledge of double-entry bookkeeping, the functions of ledger accounts, and of the use of checks, drafts, notes, vouchers, etc., in ordinary business transactions. This is developed during the summer preceding the senior year by requiring the student to take a course in double-entry bookkeeping, thus saving valuable time during the school year and effectively preparing the ground for the instruction work.

The first half of the course is based on a study of the proper form and content of the balance sheet and profit and loss statement, the principles and problems involved in the correct valuation of asset and liability items, and the related topics of depreciation, reserves, capital, surplus and dividends.

The second half of the course is devoted to cost accounting and is planned to give the student a knowledge of the best cost methods in use at the present time. It includes a thorough discussion of methods of handling and accounting for raw materials, direct labor, the distribution of overhead expenses, normal costs and their predetermination, budgeting, and cost reports and their use. [Course VI.]

Textile Microscopy—B-41. Preparation: B-23. This subject consists of the study of animal and vegetable fibers by means of the microscope and its accessories. It includes methods of illumination, sectioning and mounting, drawing with the camera lucida, measurements of diameter and twist, precision sectioning, and the use of polarized light in the study and identification of fibers. [Course VI.]

***Textile Marketing—B-42. Preparation: E-30.** This subject covers the problems of marketing textile products, with particular emphasis upon the ultimate consumer. The course will survey the principal marketing channels and marketing methods. Attention is directed to the possibilities of demand creation

and demand control, especially through market and style research. Current changes in marketing organization of the industry will be studied and reviewed. [Courses IV and VI, Options G, C, W, D.]

Textile Testing—B-43. Preparation: B-23, F-30 or G-30, D-32. This course is planned to familiarize the student with the latest methods and devices for determining the physical properties and characteristics of textile fibers, yarns and fabrics. The scope of the work is indicated by the following topics: abrasion, absorptability, atmospheric control, bursting, crimp, heat transmission, porosity, regain, resilience, stretch, tear, tensile strength, thickness, twist, waterproofness, precision of measurements, interpretation and presentation of data. These are treated both from the standpoint of commercial testing and of textile research. One two-hour period per week of testing laboratory work is included in the course. [Course VI.]

Textile Testing—B-43a. Preparation: B-23, F-20 or G-20, D-20 or D-21. This subject is presented in thirty lecture periods during the third year of the diploma courses. It is similar in content to B-43 but less extensive. [Courses I, II, III.]

Electrical Engineering—B-44. Preparation: B-31. During the first term a detailed study of the alternator is made, with particular stress on generation of three-phase currents. Methods of predetermination of alternator regulation are taken up and at least one method compared with laboratory test. Parallel operation of alternators with accompanying instruments and devices are studied in classroom and laboratory. The single phase, three-phase and Scott transformers are considered in turn and their various methods of connecting to line and alternators are systematically studied.

In the second term the induction motor and generator are studied with their particular adaptability to the textile industry. The principal starting devices for this motor are thoroughly taken up. The synchronous motor is studied particularly in relation to its ability to correct power factor. In all the work outlined above, the main features are illustrated profusely in classroom demonstrations and laboratory exercises. [Course VI, Options G, C, W.]

Mill Engineering—B-45. Preparation: B-34. This subject, given in the fourth year of the Textile Engineering course, includes many new topics, and at the same time coordinates much of the student's previous work in engineering with his knowledge of textile processes and their requirements. In detail it takes up a study of modern types of mill buildings and problems involved in their construction. Such matters as factory location, machinery layout, power transmission, heating, ventilation, humidification, fire protection and sanitary facilities are also discussed. The student is finally assigned the problem of completely designing a textile mill building and laying out its machinery and equipment so far as time permits. [Course VI, Options G, C, W.]

Business Administration—B-46. Preparation: B-10 and E-30. Recognizing the importance which executive work plays in the management of an industrial enterprise, this course has been placed in the curriculum of the Textile Engineering course in order to acquaint the student with some of the fundamental problems and principles involved, and possibly to reveal to him some of his own capabilities for this type of work. The broad topics considered are types of business organizations, financing, administration, planning, control, personnel, and human relationships. The importance of applied psychology to successful management is stressed. The student is made familiar with some of the tools of management such as purchasing systems, storeskeeping, perpetual inventories, warehousing methods, scheduling, routing, tracing, time keeping, motion studies, time studies, mnemonic symbolizing, graphical records, and wage systems.

BUSINESS LAW. Under this subject are given lectures, supplemented by the use of a suitable text, on the law governing contracts, sales, agency, partnerships, corporations, negotiable instruments, bailments and carriers, insurance, personal property, real property, suretyship and guaranty, and bankruptcy. [Course VI.]

***Mill Illumination—B-47. Preparation: B-23.** Because of the demand and the necessity for proper lighting of textile mills, this course is offered three hours per week for one term. It consists of three major parts,—photometry, illumination and installation design. Costs and estimates, safety and production are included.

The laboratory exercises include the study and applications of the photometer, Macbeth Illuminometer and foot-candle meter. The concluding work is a design of a lighting installation for a typical mill room, using the school laboratories for this purpose. [Course VI, Options G, C, W.]

Electives—B-48. Students in the second term of the fourth year of the Textile Engineering course will be permitted to elect certain textile subjects as substitutes for part of the time scheduled for engineering subjects. Thus a student is offered an opportunity for specialized study along such lines as will prove most beneficial to him at that time. The selection of elective studies is subject to the approval of the head of the Textile Engineering department and to the possibility of arranging for the same. [Course VI, Option G.]

***Principles of Selling and Advertising—B-49.** Preparation: B-36. A comprehensive course dealing with the fundamental principles of advertising and selling. The course will cover the psychology of selling and advertising, the legal restrictions in marketing, advertising technique, copy writing, layout, illustrations, advertising campaigns, packaging, advertising mediums, industrial and consumer advertising, creative salesmanship, personality, types of customers, the selling process, supersalesmanship, etc.

Lectures and the case method of instruction will be used. [Course VI, Sales Option.]

Textile Styling—B-50. Preparation: D-30. This includes fabric names, their distinguishing characteristics, purpose and suitability; study of the costume in line, mass, color and texture; the silhouette, its changes and recurrences as well as influences that in the past have changed costume as an aid to better forecast of fabrics. [Course VI, Options D, S.]

***Foreign Trade and Economic Geography—B-51.** Preparation: E-30. The course will cover the foreign markets for finished textiles and the American raw fibers, methods of selling employed, foreign commercial law that an American exporter needs, the foreign fibers and textiles and their importance in international trade.

Special emphasis will be given upon costs of foreign marketing, tariffs, international competition, possible markets and methods of building an export business. [Course VI, Sales Option.]

***Selling Policies—B-52.** Preparation: B-36. This course will cover the development of administrative policies and guiding principles in the marketing, pricing, styling and merchandising of textiles and textile fibers. [Course VI, Sales Option.]

***Statistics—B-53.** Preparations: B-20. A study of elementary statistics which relate to industry, trade and general business and financial conditions. It includes the analysis, presentation and interpretation of statistical data, index numbers, correlation, law of error, cyclical fluctuations, dispersion, trend and other pertinent topics. [Course VI, Sales Option.]

CHEMISTRY AND DYEING DEPARTMENT—C

Elementary Inorganic Chemistry—C-10. Preparation: Admission Requirements. During the first term of the first year, the class work in this course consists of three lectures, and one recitation per week on fundamental principles, and descriptive chemistry of the non-metallic elements and their compounds. This is accompanied by one afternoon per week of laboratory work, which may be on either inorganic preparations or qualitative analysis, according to the previous laboratory training of the individual student.

In the second term, one lecture and one recitation per week are devoted to the metals and their compounds, and one afternoon per week wholly to qualitative analysis, listed below as C-12. [All courses.]

Elementary Organic Chemistry—C-11. Preparation: Admission Requirements. This course, covered by lectures during the second term, includes a general survey of the fundamental principles of Organic Chemistry, also a study of the hydrocarbons and their derivatives from the point of view of their structure, preparation and uses. This work, although elementary in character, is of sufficient breadth to prepare the student understandingly for the general lectures upon coal-tar dyestuffs which are given in Course C-20. [All courses.]

Qualitative Analysis—C-12. Preparation: C-10, taken simultaneously. This is a continuation of the laboratory study of inorganic compounds, with application to their systematic analysis. It is given ten hours per week to chemists during the second term of the first year. Students with adequate preparation can make further progress by starting this work in place of elementary laboratory exercises during the first term, as indicated under C-10.

When sufficiently advanced, students take up the examination of various products with which the textile chemist must be familiar such as mordanted cloths, pigments and the various dyeing reagents.

SEMI-MICRO QUALITATIVE ANALYSIS.—Qualitative analysis for the more common elements by micro methods, with centrifuge, spot tests, etc. [Course IV.]

Qualitative Analysis—C-12a. Preparation: C-10, taken simultaneously. This course is similar to C-12, but not so extensive, being given three hours per week during the second term. [Courses I, II, III, VI.]

Stoichiometry—C-13. Preparation: C-10, taken simultaneously. Two hours per week during the second term of the first year, on the fundamental principles underlying calculations of quantitative analysis, on the gas laws, and on balancing of chemical equations. [Course IV.]

Textile Chemistry and Dyeing—C-20. Preparation: C-10, C-11, B-12, B-13a. The outline of the lecture course which is given during the second year is as follows:—

TECHNOLOGY OF VEGETABLE FIBERS.—Cotton, linen, jute, hemp, china grass. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ANIMAL FIBERS.—Wool, mohair, silk. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF MANUFACTURED ORGANIC FIBERS.—Study of the various forms of manufactured organic fibers, including the rayons and such other manufactured fibers as nylon, vinyon and lanital, the process of manufacture, their properties and action with chemicals.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching; action of soap.

The bleaching of cotton cloth, yarn and raw stock is studied at length with detailed description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is also included an exhaustive study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods for degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods for detection, their effect during the different operations of bleaching, scouring, dyeing and printing and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds, not dyestuffs, that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting assistants, mordanting principles and leveling agents.

THEORY OF DYEING.—A discussion of the chemical, mechanical, solution and absorption theories, and the various views that have been advanced by different investigators of the chemistry and physics of textile coloring processes.

Under this heading are discussed the general methods of classifying dyestuffs and the definitions of such terms as textile coloring, dyeing, textile printing, substantive and adjective dyestuffs, monogenetic and polygenetic dyestuffs.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, turmeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used within recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown and iron buff.

COAL-TAR COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Special study of basic coloring matters, phthalic anhydride colors, including the eosins and phloxines; acid dyestuffs, Janus, direct cotton, sulphur and mordant colors, including the alizarines and other artificial coloring matter requiring metallic mordants; mordant acid and insoluble azo colors, developed on the fiber; reduction vat colors, aniline black and other artificial dyestuffs not coming under the above heads.

As each class of dyestuffs is taken up, the details of the methods of applying them upon all the different classes of fabrics and in all the different forms of dyeing machines are thoroughly discussed; also the difficulties which may arise in their application, and the methods adopted for overcoming them.

MACHINERY USED IN DYEING.—A certain amount of time is devoted to the description of the machinery used in various processes of textile coloring which is supplemented as far as possible by the use of charts, diagrams and lantern slides.

Most of the important types of dyeing machines are installed within the dye-house of the school, and the students can be taken directly from the lecture room and shown the machines in actual operation. [All courses.]

Dyeing Laboratory—C-21. Preparation: C-20 taken simultaneously. Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and systematic experiments the student learns the nature of the various classes of dyestuffs and their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool, silk and the various types of rayon, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye bath, etc.

Bleaching processes applicable to various animal and vegetable fibres are studied.

Work in color matching is also carried out on a laboratory scale. A fairly extensive study of the fastness properties of representative dyes of each class is taken up as well as their suitability for various classes of work.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines which are described elsewhere.

By the use of a small printing machine the principles of calico printing are illustrated, and by means of the full-sized dyeing machines and vats the practical side of the subject is studied. It is the constant endeavor of those in charge to impart information of a theoretical and scientific character that will be of value in the operation of a dyehouse. [Course IV.]

Organic Chemistry—C-22. Preparation: C-11. The purpose of this course is to lay a broad foundation for the understanding of the basic principles of organic chemistry. The first semester consists of illustrated lectures and recitations covering the aliphatic series. The second term is devoted to the aromatic compounds. A number of problems are assigned as home exercises in order to fix the fundamental principles of the science in the student's mind. Books: Wertheim—Organic Chemistry and E. H. Huntress—Problems in Organic Chemistry. [Course IV.]

Quantitative Analysis—C-23. Preparation: C-12. The object of this course is to teach the fundamental principles of quantitative analysis, and to give the student an opportunity of acquiring skill in manipulating the special apparatus used in analytical procedure.

Typical gravimetric methods are taught the first term. The samples analyzed comprise salts, minerals and ores. Electrochemical analysis is carried out with the aid of a modern type of apparatus designed for rapid work.

The work of the second term consists of volumetric methods. A number of ores and commercial products, carefully chosen, are analyzed so as to give the student a varied experience.

The laboratory work is supplemented by lectures and recitations. Talbot's "Quantitative Chemical Analysis" 1937 Edition is used as a text. [Course IV.]

Stoichiometry—C-24. Preparation: B-10, C-10, C-13. This subject is taken one hour a week during the second year. Calculations of gravimetric analysis are studied the first term, and calculations of volumetric analysis the second term. Hamilton and Simpson's Calculations of Quantitative Chemical Analysis is used as a text. [Course IV.]

Quantitative Analysis—C-30. Preparation: C-23. The fundamental principles acquired in Course C-23 are applied in this course in the examination of materials used in the textile mill, the dyehouse, and the finishing plant. Among the materials analyzed are water, soaps, oils, fuels, and stripping agents. The latest and most practical methods are employed. Mahin's Quantitative Analysis, supplemented by "Analytical Methods for a Textile Laboratory" (as printed in the Year Book of the American Association of Textile Chemists and Colorists) is used as a text. [Course IV.]

Industrial Chemistry—Inorganic—Lecture—C-31. Preparation: C-22. During the second term of the third year lectures and recitations are held in industrial chemistry, the course in general following Riegel's "Industrial Chemistry," Third Edition. Particular attention is paid to the purification of industrial water supplies, the manufacture of heavy chemicals, such as acids, alkalies, bleach liquors, and mordants; the building industry, including the manufacture of Portland cement, glass, iron and steel.

The course is illustrated as far as possible with specimens, diagrams, and charts, and the students are given an opportunity to visit some of the industrial establishments in the vicinity of Lowell and Boston. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-32. Preparation: C-20, C-21. This is a continuation of the Textile Chemistry and Dyeing course of the second year, and includes a review of the second year's work in this subject, with the introduction of many advanced considerations, and in addition, the following subjects:—

COLOR MATCHING AND COLOR COMBINING.—A study of that portion of physics which deals with color and the many color phenomena of interest to the textile colorist. The lecture work is supplemented with the practical application of the spectroscope and tintometer, and much practice in the matching of dyed samples of textile material.

The primary colors both of the scientist and textile colorist, the results of combining coloring lights and pigments, and such subjects as color perception, color contrast, purity of color, luminosity, hue, color blindness, dichroism, fluorescence and the effect of different kinds upon dyed fabrics, are discussed under this heading.

Each student's eyes are tested for color blindness early in the course, in order that he may be given an opportunity to change his course if his eyes should prove defective enough to interfere with his work as a textile colorist.

A dark room has been provided where various experiments in color work and color matching may be performed.

DYE TESTING.—This subject includes the testing of several dyestuffs of each class, subjecting them to the common, color-destroying agencies; the determining of their characteristic properties, and their action towards the different fibers; also the determining of the actual money value and coloring power of dyestuffs in terms of a known standard.

Each student is required to make a record of each color tested upon an especially

prepared card, which furnishes a permanent record of all dyestuffs, their dyeing properties, fastness to light and weather, washing, soaping, fulling, perspiration, bleaching, steaming, ironing, rubbing, acids and alkalies.

UNION DYEING.—A study of the principles involved in the dyeing of cotton and wool, cotton and silk, and silk and wool union materials in the production of solid and two-color effects.

TEXTILE PRINTING.—A thorough study of the whole subject of textile printing, each student being required to produce individually no less than twenty different prints, including the following styles; pigment style, direct printing style, steam style with tannin mordant, steam style with metallic mordant, madder or dyed style, the ingrain or developed azo style, discharge dye style, discharge mordanted style, resist style, indigo printing, aniline black printing.

The different parts of the calico printing machine are thoroughly studied; also the precautions which must be considered in its use, and the arrangement of the dyeing apparatus which must accompany such a machine.

Special attention is paid to the methods of mixing and preparing the various color printing pastes that are used in the above work upon a manufacturing scale as well as experimentally in the laboratory.

COTTON FINISHING.—A study of the various processes of finishing cotton cloth and the different materials used therein. The work involves the discussion of the various objects of cotton finishing and such operations as pasting, damping, calendering, stretching, stiffening, mercerizing, beetling and filling, and the various machines used for carrying out these processes.

DYE HOUSE AND FINISHING PLANT MANAGEMENT.—A study of the organization and management of the modern bleacheries, dyehouses and finishing plants.

MILL VISITS.—During the third and fourth years visits are made to some of the large dyehouses, bleacheries and print works in the vicinity. [Course IV.]

Physical Chemistry—C-33. Preparation: B-10, C-10, C-13. During the third year, three hours per week of lectures and recitations are given on the application of the experimental methods and calculations of physics to chemical phenomena. Students passing this course may supplement it by the optional laboratory course C-42 in the fourth year. [Course IV.]

Organic Chemistry—C-34. Preparation: C-22. This course (one semester) is a continuation of Organic Chemistry C-22 extending over the alicyclic and heterocyclic series. The lectures also touch upon certain special topics such as general synthetical methods, theoretical considerations, natural products (vitamins, hormones, chlorophyll, the blood pigments, alkaloids), dyestuffs, etc., Book: Panagiotakos—Organic Chemistry. [Course IV.]

Technical German—C-35. Preparation: C-20, C-22, E-21. This course consists of the reading of German technical literature with the object of familiarizing the student with the current German publications in textile chemistry and coloring. [Course IV.]

Organic Chemistry Laboratory—C-36. Preparation: C-20, C-22, C-23. A number of typical organic compounds are synthesized by general methods. A special problem is also assigned to train the student in longer or more difficult syntheses (one semester). Laboratory Book: Gatterman-Wieland—Laboratory Methods of Organic Chemistry. [Course IV.]

Organic Chemistry Laboratory—C-41. Preparation: C-20, C-22, C-23. A number of typical organic compounds are synthesized by general methods. A special problem is also assigned to train the student in longer or more difficult syntheses. Laboratory Book: Gatterman-Wieland—Laboratory Methods of Organic Chemistry. The second semester is devoted to the qualitative identification of organic compounds. Laboratory book: Mulliken-Huntress—Identification of Organic Compounds. [Course IV.]

Industrial Chemistry—Organic—C-42. Preparation: C-31. The chemistry and technology of the important organic industries, *i.e.*, rubber, petroleum, dyestuffs, drugs, explosives, oils, fats, soaps, waxes, plastics, fermentation products, etc., is considered, with special emphasis on rubber, petroleum and explosives in view of present war conditions. Synthetic methods and the research and development phases are stressed. [Course IV.]

Chemical Textile Testing—C-43. Preparation: C-21, C-32. A series of lecture and laboratory periods covering the theory and use of the instruments and methods used in testing and evaluating textile materials.

PHYSICAL TESTING.—Statistical methods, relative humidity, regain, staple, hair weight, fiber resiliency, counts and denier, twist, evenness, cloth count, weight, crimp, thickness, porosity, permeability, waterproofness, wetting out, absorbency, shrinkage, thermal insulating value, handle or draping quality, wear or abrasion, strength and stretch.

CHEMICAL TESTING.—Inorganic extraneous matter: ash, ash alkalinity, silk weighting, acids and alkalis. Organic extraneous matter: scouring loss, extraction, sizing and finishing materials. Fiber mixtures: qualitative analysis, quantitative analysis. Swelling and damage in cellulose fibers: qualitative tests, barium activity number, ash alkalinity, solubility in sodium hydroxide, Methylene Blue absorption, copper number, fluidity. Damage to wool: lead acetate test, thiocyanate test, Pauly test, methylene blue test, sulfur content, total nitrogen content, soluble nitrogen, ammonia nitrogen, solubility in dilute alkali. Damage to silk: Zimmermann test, total nitrogen, ammonia nitrogen, viscosity in zinc chloride.

OPTICAL TESTING.—Colorimeter, tintometer, pH apparatus, refractometer, spectroscope, spectrophotometer, ultra-violet, infra-red, luster. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-44. Preparation: C-32. This is a continuation of the third-year work in Advanced Textile Chemistry and Dyeing, and includes the following subjects:—

CLASSIFICATION AND MOLECULAR STRUCTURE OF ARTIFICIAL DYESTUFFS.—A study from a more advanced standpoint of the classification and constitution of artificial dyestuffs including the various methods used in their production, also the orientation of the various groups which are characteristic of these compounds and their effect on the tinctorial power of dyestuffs.

The object of this study is to give the student a more complete knowledge of the artificial dyestuffs from the color manufacturer's point of view, which will prove of particular value to those who intend later to enter the employ of dyestuff manufacturers or dealers.

ECONOMICS OF THE DYEING, BLEACHING AND FINISHING INDUSTRIES.—A study of the factors to be considered in the establishment of a dyeing, bleaching and finishing plant together with the most essential considerations of its management.

ADVANCED DYEING CONFERENCE.—During the latter part of his course each student will be required to write, for presentation before the other members of his class, a paper upon some assigned subject of general interest. After presentation the subject will be open to discussion and question.

The object of this conference is twofold. First, to give the student experience and practice in systematically looking up an assigned subject and presenting it before others; and secondly, to bring before the class a greater variety of subjects with more detail than could be covered by the general lectures of the course. [Course IV.]

Microscopy and Photomicroscopy—C-45. Preparation: B-23, C-20, C-22. A course of lectures and laboratory experiments on the use and construction of various types of microscopes and accessories, followed by the preparation of longitudinal and cross-sectional mounts of the various fibers. After a study of the different starches, fibers, and fabrics, a series of unknowns are examined and reported upon.

The lectures also include the subject of photomicroscopy. The laboratory course may be selected by the student as an optional course. [Course IV.]

Quantitative Analysis—C-46. Preparation: C-30. This course consists of lectures, recitations and quizzes on fuels and on the fundamental principles of analytical chemistry. [Course IV.]

Report Writing—C-47. Preparation: B-20a, E-20. The primary purpose of this course is to enable the student to write a technical report clearly and precisely; to this end it is necessary to present the data efficiently and with due regard to its accuracy. The meaning and determination of significant figures, the applications of statistical analysis, and the preparation and use of graphs are first studied. Suggestions on experimental work and the interpretation of results are then given.

Formal and informal, technical and non-technical, laboratory, plant, and consultants' reports are discussed, and practice is given in their preparation. Instruction is also given on the use of the technical literature and the preparation of bibliographies. [Course IV.]

Textile Literature—C-48. Preparation: C-47. The object of this course is to introduce the student to the classical and current sources of information on textile chemical subjects. Each student is given certain references or subjects to report upon, which are sufficiently varied in origin as to make him familiar with the principal reference works and journals of textile chemistry. [Course IV.]

Advanced General Chemistry—C-49. Preparation: C-10, C-12, C-24, C-34, C-42, C-46. The object of this course is more to correlate the various branches of chemistry studied in the previous three and one-half years than to introduce new material. An attempt is made to show the essential oneness of all chemical knowledge. Recent theories are discussed briefly. [Course IV.]

Colloid Chemistry—C-50. Preparation: C-33. A lecture course on general colloid chemistry followed by its applications to textiles.

GENERAL.—Adsorption, surface tension and wetting-out, preparation and precipitation of suspensoidal sols, electrophoresis, emulsions, preparation and precipitation of emulsoidal sols, properties of irreversible emulsoids, protective colloids and detergents, gels, amorphous solids, use of X-rays, properties of proteins.

TEXTILE APPLICATIONS.—Cellulose, swollen cellulose, hydrocellulose, oxycellulose, ligno-cellulose, paper, cellulose esters and lacquers, rayons, silk, wool, silk weighting, mordanting, dyeing, felting of wool. [Course IV.]

The Chemistry of Rayon, Its Manufacture, Bleaching, Dyeing and Finishing—C-51. Preparation: C-32. During the past five years the developments of the bleaching, dyeing and finishing of rayon and other manufactured organic fibers, sometimes referred to as synthetic fibers, have been systematically studied and the curriculum of the Chemistry and Textile Coloring course has been revised from time to time to cover the latest developments in regard to these fibers. A complete unit for the actual manufacture of rayon is available for experimental and demonstration purposes, and the course includes laboratory practice in the manufacture of viscose rayon.

Many of the difficulties which arose during the early days of the so-called artificial silk industry were due to lack of knowledge of its properties and more or less persistent attempts to handle it in just the same manner as real silk. As soon as the textile manufacturer began to fully appreciate the fact that the various rayons were entirely different fibers from true silk and consequently must be handled by different methods, then many extensive improvements were made in the processes of manufacturing textiles containing these fibers. In order to satisfactorily handle the different rayons they must receive a preliminary treatment with various oils and softeners, and as a result the problem of establishing the specifications for the best type of oil to use for this purpose and also the best methods of removing it from the material during the finishing process have been important problems in the development of the industry, and these among others are being studied in the Lowell Textile Institute at the present time. [Course IV.]

Chemical Engineering—C-52. Preparation: B-20a, C-31, C-42. This course covers descriptive and quantitative information on the following branches of chemical engineering: flow of fluids, flow of heat, hygrometry, humidification and dehumidification, drying, textile drying, materials of construction, and any of the other unit processes for which there is time. The course consists of lectures supplemented by the working of numerous practical problems. [Course IV.]

Elective Subjects or Thesis during fourth year—C-53. Preparation: Satisfactory completion of all first and second year subjects in Course IV. The value of undergraduate thesis work for all students has frequently been questioned. There is no doubt that many senior students might take elective work of an advanced nature to greater advantage than devoting the same amount of time to specific thesis work. With this in mind several electives have been introduced, each elective period being 45 hours per term and four of these being required during the year.

Thesis. If a student has indicated through the first three years of his work that he is capable of handling an original investigation, a definite thesis subject may be assigned to him which will require the entire 180 hours. At the discretion of the Head of the Department, thesis subjects involving one or more elective periods may also be assigned.

In all cases, however, 180 hours' work of an advanced nature, either of thesis work or elective subjects, will be required for graduation.

Photography. A laboratory course in scientific or record photography, including developing, printing, enlarging, preparation of lantern slides, photography of apparatus and procedures, copying, and use of color filters. This course must be taken in preparation for Photomicroscopy.

Photomicroscopy Laboratory. A series of laboratory experiments followed by a research problem in photomicroscopy. The optical system, exposure, and use of color filters is studied and work is done on both fibers and fabrics. Students taking this elective should have had Photography or the equivalent in experience.

Advanced Microscopy. A laboratory course along one or more of the following lines:—

Quantitative microscopy: deconvolution count, classification and grading of wools, quantitative analysis of fiber mixtures.

Polarized light: production, optical effects, uses.

Cross-sectioning: advanced work on methods and refinements in technique.

Colloid Chemistry Laboratory. Experiments illustrating and amplifying the lecture course are performed. These may be on adsorption, hysteresis, surface tension, wetting-out, dialysis, viscosity, protective colloids, emulsification, detergency, gels, swelling, iso-electric point, dyeing.

Textile Chemistry Laboratory. A laboratory course on some branch of textile chemistry of particular interest to the student. This course is usually in the form of directed research.

Microbiology I. This course gives a general survey of the effect of the various micro-organisms on textile materials. Consideration is given to the methods of studying molds and bacteria and the methods of preventing their growth on textiles. In the laboratory the isolation, identification and properties of the organisms are studied. The detection of micro-organisms on fibers and damage to fibers caused by their growth is studied in detail. Methods of testing antiseptics to be used on textiles are also studied.

Microbiology II. A continuation of Microbiology I, laying special emphasis on the branch of microbiology in which the student is most interested. No lectures are given but each student is required to do certain reading and frequent conferences are held with the instructor. In the laboratory each student selects some problem and works it out as thoroughly as time permits.

Rayon. Advanced study of rayon dyeing.

Physical Chemistry. Measurement of molecular weights, heats of reaction, vapor pressure, surface tension, hydrogen ion concentration, electrical conductivity, etc.

Advanced Preparative Chemistry. The student is required to carry through certain preparations starting with a weighed minimum and handing in a weighed product. The preparations are so chosen as to review the principles of inorganic chemistry and at the same time develop the student's laboratory technique. By basing the grade on quantity as well as quality of product obtained, careful technique is encouraged. Conferences and quizzes are given before and after each preparation. The student is constantly required to apply the principles of previous lecture courses in analytical, inorganic and physical chemistry.

Textile—Chemical Engineering—Preparation: B-11, B-12, B-13, B-23, C-20, C-24, C-42. A combination of lectures and laboratory work designed for the study of the thermal properties of fluids, laws of thermo-dynamics as applied to batch and flow processes, flow of heat, mechanical mixtures, and heat engines.

This course will include such practical applications to the dyeing, printing, and finishing branches of the textile industry as efficient use of steam in heating dye

kettles—steam traps—measuring of steam used—calculating steam costs—study of best methods of piping steam for manufacturing purposes and economics of hot water storage.

Compression and fluid handling, testing of pumps, fans and similar chemical engineering equipment including some calibration of instruments will serve to give the student a general over-view of elementary chemical engineering.

Glass Blowing. A course in the elements of laboratory glass blowing, designed to give the man going into laboratory work a familiarity with the methods of handling both soda glass and Pyrex. All the ordinary seals and joints used in construction of apparatus are described and tried out in the laboratory.

Leather Chemistry. This course deals with the chemistry and technology of leather manufacture as well as with the fundamental chemistry of proteins and enzymatic action. It includes the consideration of high molecular weight compounds, the chemistry of fats and proteins, the action of the leather industry including tanning operations, and various applications of analytical chemistry.

Color Matching. A further study of the principles involved in color matching accompanied by actual matching in the dyeing laboratory of many dyed samples of a variety of colors.

Explosives and Chemical Warfare. The history, chemistry, physiological action and military use of the war poisons and of explosives is taken up. The course also treats of the protective measures against chemicals and the tactical use of the weapons.

Advanced Organic Chemistry. This course deals with theoretical organic chemistry and the biochemical aspects of the science such as the isolation, proof of structure and synthesis of physiologically important compounds and the chemistry of synthetic compounds of biochemical interest.

TEXTILE DESIGN AND WEAVING DEPARTMENT—D

Textile Design and Cloth Analysis—D-10. During the first year instruction is given in the subject of classification of fabrics, use of point or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks, stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

This subject takes up in a systematic manner the analysis of samples illustrating the various cloth constructions for the purpose of determining the design of the weave and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric. [First term, all courses.] [Second term, Courses I, II, III, VI.]

Textile Design and Cloth Construction—D-20. For Cotton Goods—Preparation: D-10. During the second year consideration is given to fancy and reverse twills, diaper work, damasks, skip weaves, sateen fabrics with plain ground, backed fabrics, and multiple ply fabrics. Students are required to make original designs and put the same into the loom. Special attention is given to the consideration of color effect.

During the first term free-hand drawing is taught by means of plates, and practice in coloring is given in conjunction with this work.

Practice in lettering, spacing and general arrangement of designs and sketches is given. The engineering alphabet is used in all work.

During the second term instruction is given in drawing, sketching, coloring and designing, with reference to their application in textiles. Good examples of applied design in textiles, as well as in other branches, are used as a basis for modified designs selected and composed by the student. This stimulates originality as well as teaches the student to appreciate good designs and color.

The analysis of these fabrics forms a part of the course in design. This also

includes the necessary calculations required to reproduce the fabric or to construct fabrics of similar character. [Courses I, III, VI, Options C, D, S.]

Textile Design and Cloth Construction—D-21. For Woolen and Worsted Goods—Preparation: D-10. During the second year the instruction given includes warp and filling backed cloth, figured effects produced by extra warp and filling, double cloths, multiple ply fabrics, cotton warps, blankets, bathrobes, crepes, filling reversible, Bedford cords, imitation furs, crepons, matelasse and imitations, double plain, ingrains, velvets, corduroys, overcoatings, trouserings.

The analysis of these fabrics, together with the consideration of the shrinkages and dead loss in all fabrics, theory of diameter of yarns, and costs of blends and mixes is a part of this course. [Courses II, III, VI, W, D, S.]

Textile Design and Cloth Construction—D-22. Preparation: D-10. This is a short course covering the elementary principles of designing in general. Instruction is given in the theory of shrinkages and the lay-out of woolen and worsted fabrics, and at the same time similar instruction is given in the design and construction of cotton fabrics. [Course VI, General Option.]

Jacquard Design—D-23. Preparation: D-10. This course, given during the second term, covers detail instruction of the Jacquard machine and the various tie-ups in common use, the layout for different kinds of fabrics, and the cutting of cards in accordance with prepared designs. The adaptation of various designs to woven fabrics through the aid of cross section paper and its correlation with the different types of looms and Jacquard machines are thoroughly covered. The student is encouraged in original designs and such of these as meet approval are carried out in woven goods. [Course III.]

Power Weaving—D-24. Preparation: D-10. In connection with the work in Textile Design and Cloth Analysis practical work is carried on upon the power looms. This includes the preparation of warps, beaming, dressing, sizing, drawing-in and making of chains, spooling and quilling, and the machinery for the same. A study is made of warpers and sizing machines for cotton, woolen, silk and rayon. Lectures are given to correspond with the progress of the student in the Power Weaving Laboratory covering the following subjects: loom adjustments, chain building, cam looms, automatic shuttle changing looms, dobby looms, single and double acting dobbies, Knowles looms, leno weaving, center selvedge motion, automatic filling changing looms, towel and other pile cloth weaving, Jacquard looms, single and double lift leno Jacquards, Jacquards of special design, the cutting and lacing of cards, and tying up Jacquard harness. The Baker automatic attachment for mixing the filling is also considered. [Courses I, II, III, VI.]

Power Weaving—D-24a. Preparation: D-10. This is a lecture course given during the first term and covers briefly the fundamentals of weaving, types of looms suitable for weaving different fabrics, warp preparation, especially slashing machinery and compounds for rayon, cotton, woolen and worsted yarns. [Course IV.]

Perspective—D-25. Preparation: B-13. A mechanical method of representation. [Courses III, VI, D.]

Textile Design and Cloth Construction—D-30. Preparation: D-20 or D-21. The advanced work takes up the more complicated weaves adapted to harness work, and leads into leno and Jacquard designs. The following is a brief list of the subject heads, which will give some idea of the course: double plain cloths, ingrains, tricots, chinchilla, tapestry, blankets, upholsteries, spot weaves, pile or plush, crepon, matelasse and its imitations, pique, Marseilles, quilting, and miscellaneous designs for Jacquard, leno, fustian, tissue fabrics and lappets.

Original designs and sketches for particular grades of goods and the study of color effects form an important part of the third-year course. It should be understood that work in decorative art is carried on in conjunction with textile construction and weaving, particularly on the Jacquard loom. Designs of merit are carefully developed in detail and woven into cloth.

The work in cloth construction includes the application of the different weaves and their combinations in the productions of fancy designs, both modified and original; the calculation involved in the reproduction of standard fabrics changed to meet varying conditions of weight, stock, counts of yarn and value; and the discussion of the breaking strength of fabrics and relationship of the construction of the fabric to breaking strength.

Instruction in this subject, which is given by classroom work, is intended to bring together the principles considered under the subject of design, cloth construction, weaving and yarn making of previous years, and to show the bearing each has in the successful construction of a fabric. [Courses III, VI, Options D, S.]

Power Weaving—D-32. Preparation: D-20, D-21, or D-23. Instruction is given in weaving on fancy woolen and worsted looms, single and double acting dobbies, leno weaving, double and single lift Jacquard looms, tying up Jacquard harness, leno Jacquard, harness and box chain building; warp preparation for woolen, worsted, cotton, silk and rayon; formulas for making up different kinds of sizing. Lectures are given to correspond with the same. Automatic shuttle changing looms and automatic filling changing looms are taken up as well as the Baker attachment for mixing filling. [Courses I, II, III, VI.]

Color—D-33. A study of color wheels, values and chromas, combinations and proportions as well as color to produce a pleasing effect for the design in question. [Courses I, II, III and VI, Options D, S.]

Principles of Design—D-34. This is in preparation for the Jacquard course. Through the principles of decorative design an understanding is acquired for the proper balance, distribution and repetition of motifs suitable for both the woven or the printed pattern. [Courses III, VI, Options D, S.]

Jacquard Design and Weaving—D-40. Preparation: D-23. Instruction bears particular stress on the sketching of original designs as applied to particular fabrics with reference to the more advanced forms of fabrics and warp tie-ups. In this work the student not only produces his own sketches but must carry his ideas through to the finished fabric. [Course VI, Options D, S.]

Textile Design and Cloth Construction—D-41. Preparation: D-10, D-20, D-21. The work in this course is the application of the instruction received during the three years previous. Particular attention is given to the layout of designers' blankets. Instruction in the production of new designs is given by the use of design suggestion sheets. As in the Jacquard work the student must not only lay out the blankets but must put them in the loom and work out the various effects for himself. [Course VI, Options D, S.]

LANGUAGE AND HISTORY DEPARTMENT—E

English—E-10. Preparation: Admission Requirements. A technically trained man should be able to express himself clearly, forcibly and fluently, as inability to do so will be a serious handicap to him in after life. The object of the English course is to develop the student's power of expression by a thorough study of the principles of advanced rhetoric and composition, and by constant writing of themes illustrative of the four forms of discourse, viz., description, narration, exposition and argumentation. In addition to the study of rhetoric and composition and the writing of themes, several classics such as are not read in the preparatory schools are studied and discussed. [All courses.]

Elementary German—E-11. Preparation: Admission Requirements. This course is intended for first-year students who do not offer German as an entrance requirement and who desire to take the course in Chemistry and Textile Coloring. It may be selected by students taking the Textile Engineering course who have not fully met the entrance requirements in language. The work is elementary in character, and much time is devoted to the study of the rudiments of German grammar with practice in composition. During the latter part of the year considerable attention is given to the reading of ordinary German prose, which serves as an additional preparation to the student for the later reading of works along scientific and industrial lines. [Course IV.]

English—E-20. Preparation: E-10. The curriculum of this course is based upon the sound belief that the young man about to enter business can profit much by the study of the principles and the rules of standard English as applied to business writing. The student is given a comprehensive remedial review of the fundamentals of grammar in their relation to practical expression in writing letters and reports. Class discussions of actual quoted letters, collateral readings, and home

preparation of written assignments afford the student abundant opportunity to enlarge his vocabulary and to improve his style. During the second semester, modern essays and other works of fiction are read and discussed. The course meets twice each week. [Course IV.]

Advanced German—E-21. Preparation: E-11. For students taking the course in Chemistry and Textile Coloring the elementary course of the first year is continued throughout the second year. The work consists of the study of some of the more advanced principles of grammar, and especially of the reading of scientific German, dealing with a variety of subjects, and the translation of commercial German. [Course IV.]

Economics—E-30. Preparation: E-10. This course, meeting three times a week, is conducted by means of lectures, discussions, and recitations, supplemented by textbook reading and study of charts analyzing various phases of industrial problems. The character of the course is descriptive and practical rather than theoretical, and the aim is to acquaint the student with the accepted principles of economics and some of their applications to industrial conditions.

The course will also deal briefly with economic history, showing how the present economic system has evolved from past systems and pointing out how the experience of the past can aid in the solution of present problems.

Besides the historical material, other topics discussed are the nature and scope of economics; the evolution of economic society; the three factors of production, land, labor and capital; the four elements in distribution, rent, wages, interest and profits; business organization; value and price; monopoly; money, credit and banking; international trade; protection and free trade; transportation; insurance; economic activities of municipalities; and public finance. In short, it is an outline course dealing with the fundamental principles that underlie a wide range of activities. [Courses IV, VI.]

Seminar in Business English—E-40. Preparation: E-10. This course is a conference course for those who wish to pursue intensive advanced study in the field of business English. Second semester, one hour each week. [Course IV.]

COTTON YARNS AND KNITTING DEPARTMENT—F

Cotton Carding—F-20. Preparation: B-10, B-12, B-13. This course is given in the first term of the second year and includes instruction regarding the growth, classing and handling of raw cotton and the processes of opening, picking and carding. Considerable time is spent studying cotton production and characteristics so that the student may have a real appreciation of some of the processing problems originating in the cotton itself. The basis of cotton classing is thoroughly covered here and the general background of how cotton is bought and sold is explained.

The mill processes of opening, picking and carding, and the many different types of machines in use are thoroughly studied. Special textbooks with many illustrations have been prepared so that the student may devote his entire attention to class discussions. The calculations pertaining to the various operations are covered in detail. The various settings possible and their effect on quality or production are made clear also.

The laboratory work for this course includes classing practice, fiber study and comparison, waste tests and comparisons, and studies of machine constructions and gearings. [Course I.]

Cotton Carding—F-20a-b-c. Preparation: B-10, B-12, B-13. These courses include the same lectures as course F-20 but the time devoted to laboratory work is reduced progressively in the order given. [F-20a Course VI, Option C; F-20b Courses III, VI, Options G, S; F-20c Course VI, Option D.]

Cotton Carding—F-21. Preparation: F-20. This course, given in the second term of the second year, is a continuation of the work of the first term and includes work on carding, combing, drawing and roving. Here again, special textbooks have been prepared with many illustrations, showing machine cross-sections and details of different actions and parts. While the main part of the work is to clearly explain the purposes and principles of each machine, all the various calculations and set-

tings pertaining to each are carefully studied and problems are assigned for student practice.

The laboratory work required in connection with this course includes a series of specific experiments illustrating various phases of the work of each operation. Other laboratory work consists in processing various lots of cotton in preparation for spinning. [Course I.]

Cotton Carding—F-21a-b-c. Preparation: F-20a-b-c respectively. These courses include the same lectures as Course F-21 but the time devoted to laboratory work is reduced progressively in the order given. [F-21a Course VI, Option C; F-21b Courses III, VI, Option G; F-21c Course VI, Options D, S.]

Cottons F-22. Preparation: F-20 taken simultaneously. This course consists of lectures and laboratory work, supplementary to Course F-20, for those students who study cotton only. Some time is spent on the details of cotton fiber growth and structure and in comparing cotton with other fibers. The economic importance of cotton is studied and sources of information regarding cotton and its processing are given to the class. [Courses I, VI, Option C.]

Cotton Waste Processing—F-23. Preparation: F-20, F-21. For those specializing in Cotton Manufacture, this course provides a survey of the methods and machinery used in processing cotton wastes, or new cotton handled on waste machinery. The lectures consider the sources of the various wastes, their preparatory treatment and the manufacturing processes. Samples of wastes and products are used to demonstrate the possibilities in this field.

The laboratory work of Courses F-20 and F-21 provide practice with some wastes and their processing. [Courses I, VI, Option C.]

Cotton Spinning—F-30. Preparation: F-21. This course is a continuation of the study of yarn manufacture and covers the many types of regular and long draft spinning. Such details as spindles, rings, travelers and buildiers are carefully explained and such factors as twist, contraction and strength of yarns are thoroughly studied. Particular consideration is given to the production of yarns for different uses and how desired characteristics may be obtained. All the calculations regarding yarns and spinning frames are thoroughly studied and problems are assigned for student practice.

The laboratory work for this course includes a series of specific experiments and tests illustrating important phases of the operations and practice in spinning various counts from roving which the students have made previously. [Course I.]

Cotton Spinning—F-30a-b. Preparation: F-21a and F-21b-c respectively. These courses include the same lectures as Course F-30 but the time devoted to laboratory practice is shortened in different degrees. [F-30a Course VI, Option C; F-30b Courses III, VI, Option G, D, S.]

Cotton Winding and Twisting—F-31. Preparation: F-30. This course is a continuation of the course on spinning, in which the instruction includes the conclusion of spinning, spooling and the various types of winding, twisting of common and fancy yarns and such incidental features as reeling, baling, mule spinning and rope manufacture. (Some of these items are optional.) All the calculations regarding winders and twisters are thoroughly studied and problems are assigned for student practice.

The laboratory work includes specific studies, experiments and yarn analyses. Other work required involves the winding of yarns under various conditions and the production of plied yarns to meet specified construction. [Course I.]

Cotton Winding and Twisting—F-31a-b. Preparation: F-30a-b respectively. These courses include the same lectures as Course F-31 but the time devoted to laboratory practice is shortened in different degrees. [F-31a Course VI, Option C; F-31b Courses III, VI, Option G, D, S.]

Cotton Quality Control—F-32. Preparation: F-21, F-30, or F-21a, F-30a. While it is customary to point out defects in the materials during the processing in all the laboratory work, this course provides a logical summary of the usual defects which appear in different stages of cotton manufacture. The student is taught to recognize defective work and is given the usual causes of the common defects. The usual procedures and methods necessary to avoid or correct the defects are ex-

plained. Many samples of defects are used to illustrate this course. Every effort is made to develop the student's diagnostic ability so that he may readily recognize and remedy new defects as he meets them. [Courses I, VI, Option C.]

Staple Fiber Manufacture—F-33. Preparation: F-21, F-30, or F-21a, F-30a. Using the preparatory courses as a background, this course offers a study of the methods of manufacture of various staple fibers, such as wool, rayon or the new synthetics, on regular or modified cotton machinery. As this is a rapidly changing field, the course is planned to take advantage of the new developments as they appear. Considerable of the work in this course is of the discussion type, which aims to correlate all the work on yarn manufacture and bring it to bear on the processing of staple fibers. [Courses I, VI, Option C.]

Cotton Organization—F-34. Preparation: F-21, F-31a or b. This course correlates all the work on Cotton Manufacturing. Starting with a study of actual mill organizations the class is carried forward to problems in developing new organizations for specific types of products. The adaptations for long draft and the handling of staple fibers are carefully covered. The machinery necessary to keep plants in balance is calculated, with some consideration of the best arrangements for economical handling. Some time is given to the use of efficiency work and end breakage studies for cotton mills. [Courses I, VI, Options G and C.]

Thesis—F-35. Preparation: F-21, F-30. Each student is required to present a thesis which is a report of some original work. In some cases this is the production of some yarn or fabric to meet certain requirements. In other cases, the thesis is a study of some technical problem regarding the effect of certain changes in manufacturing conditions. [Course I.]

Knitting—FK-21. Preparation: B-12, D-10. This partial course, which is given in the second term of the second year for certain options of the engineering course, covers the first half of the lectures and laboratory work given in Course FK-30. [Course VI, Options, D, G.]

Knitting—FK-30. Preparation: B-12, D-10. This course is a broad survey of the important types of knitting. Considerable stress is placed on the various stitches and the characteristics of fabrics from each. Starting with flat machines, the work advances through small ribbers, automatic hosiery machines, full fashioned hosiery machines, underwear machines and warp knitters. The analysis of knit fabrics and the classifications and routines for manufacture of hosiery and underwear are included.

The laboratory work consists of a series of carefully organized experiments in which the students operate standard machines to produce some knitted article or fabric. Auxiliary equipment for transferring, looping and sewing is available if needed. Fabric and hosiery analysis are included in this work. [Courses I, II, VI, Options C, W.]

Knitting—FK-30a. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but does not include any laboratory work. [Course VI, Option G.]

Knitting—FK-30b. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but has only one-half the laboratory time. [Course VI, Option S.]

Knitting—FK-31. Preparation: FK-21. Given in the first term of the third year, this is a continuation of Course FK-21 and completes the work given as lectures and laboratory in Course FK-30. [Course VI, Options D, G.]

Knitting—FK-40. Preparation: FK-31. This is an advanced course for students who are specializing in knitting. With the approval of the department, the student may select a particular field from the various sections of the knitting industry and concentrate on its problems. [Course VI, Option G.]

WOOL DEPARTMENT—G

Fiber Preparation—G-20. Preparation: B-10, B-12, B-13. RAW MATERIALS.—A study of raw materials which enter into the manufacture of woollen or worsted yarns, or which are made into yarns by processes similar to those em-

ployed in the manufacture of woollen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel's hair, cotton, flax, hemp, jute, ramie and cut staple.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lecture and by actual sorting of fleece wool under the direction of an experienced wool sorter. The various characteristics and properties are explained, as are also trade names, such as picklock, XXX, XX, $\frac{1}{2}$ -blood, $\frac{3}{8}$ -blood, $\frac{1}{4}$ -blood, delaine, braid, etc. Some skill is acquired in the estimation of shrinkage and in judging the spinning qualities.

WOOL SCOURING.—The object of scouring and the methods employed are explained, and this involves the consideration of the soaps and chemicals used in scouring; also the waste products and their utilization. Actual work is done in scouring a commercial quantity of wool by machines that are made similar in operation to regular commercial machines. At the same time the use of dryers, their operation and regulation is taken up.

CARBONIZING.—The various methods of stock carbonizing are explained in detail in the lecture course. Actual carbonizing of noil, burr waste, and defective wool is carried out by the sulphuric acid method on commercial size machines in the laboratory.

TOP MAKING AND COMBING.—This branch takes up in all detail the carding of wool on a worsted card, the preparing processes, back-washing and Vigoureaux printing, also gilling of the stock before and after combing. The construction of the gill boxes and combs is studied by lectures and by dismantling and assembling these machines in the laboratories. Later, quantities of stock are made into top and then into yarn.

The Noble comb is studied, and the various calculations to determine draft, noiling, tear, productions, etc., are made. [Courses II, III, VI, Options G, W, D, S.]

Woollen Yarn and Reworked Fiber Manufacture—G-21. Preparation: B-10, B-12, B-13. REWORKED FIBER.—Rags of all kinds are studied, sorted, and all processes necessary to convert them into fiber are covered in detail.

WOOL BLENDING, OILING AND PICKING.—Mixing and shading of colors and qualities of wool are studied and practiced. The details of Burr Pickers and mixing pickers including the Fearnought are studied in full. The importance of oils and emulsions is stressed in lecture and laboratory.

WOOLEN CARDING.—The system of carding wool for woollen yarn is fully explained, as is also the construction, setting and operation of the cards. A part of the work is the reclothing and grinding of the cylinders, strippers, workers, etc. The carding of suitable and commercial quantities of wool, and the further manufacture of it into yarn, serves to fix the principles of carding in the mind of the student, as well as to give him some skill in handling machinery.

WOOLEN SPINNING.—The computations necessary in converting roping into yarn are fully explained. The details of construction and operation of the spring and cam type mule are well covered in lectures and practice. The theory and practice of continuous or ring spinning for woollen is also taken up. The conditioning of yarn after spinning by steaming is explained.

Costs and details of a yarn mill are mentioned in brief as well as some causes of poor yarn and its effect on mill production. [Courses II, III, VI, Options G, W, D, S.]

Worsted Yarn Manufacture—G-30. Preparation: G-20. INTERSECTING GILL BOXES AND FRENCH COMB.—The equipment of the laboratory offers opportunity for the production of dry-combed top and its comparison with oil-combed top produced on the Noble comb. The structures and uses of intersecting gill boxes and the study of combing and drawing blends is taken up at this point.

DRAWING AND SPINNING.—The laboratory equipment consisting of the Bradford (English) system of drawing, of both open and cone types, as well as the various processes of French drawing, followed by both worsted mule and ring spinning frame, make possible a thorough study of the manufacture of worsted yarn by all of the existing methods.

The same method of study of mechanisms, calculations, and operations of the

various machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

ORGANIZATION.—At the end of the course the layout of a properly balanced yarn mill is studied, and at the same time the cost of machinery, depreciation, labor costs and machinery arrangements.

THESIS.—Before graduation the student must present visible evidence of his knowledge of woolen and worsted manufacture by the production of twenty yards of fabric from his own design (or reproduction or modification of some existing fabric) beginning with the raw material.

A formal typewritten description, including all calculations and observations, together with samples from each machine, must be presented to the head of the department before the final examination. [Courses II, III, VI, Options G, W, D, S.]

Technology of Wool Manufacture—Lectures and Demonstrations—G-40. Preparation: C-21, C-32, D-10. This course is planned to supplement the instruction already given in design, cloth construction, chemical technology of fibers, scouring, dyeing and finishing, with sufficient lectures and demonstrations in sorting, scouring, backwashing, gilling, combing, top-making, English drawing, spinning, twisting, warping, and weaving, to make the processing of grease wool and allied fibers into ordinary worsted spun yarn fabrics, clear as to object and continuity.

The manufacture of virgin and reworked wool into woolen spun fabrics, with scouring, carbonizing, mixing, picking, carding, spinning, twisting, warping and weaving is also given. Illustrated descriptions of the manufacture of hardened, woven and needle loom felts are taken up.

Mechanical details and calculations are subordinated to familiarizing the student with the nature and object of the several processes. [Course IV.]

FINISHING DEPARTMENT—H

Woolen and Worsted Finishing—H-30. Preparation: B-12, C-10, D-10, D-24. The outline of this course, which is given by means of lecture and laboratory work, is as follows:—

BURLING AND MENDING.—Under this head is taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are all considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the early types of stocks, hammer falling and crank stocks, and their modifications and development into the present type of rotary fulling mills of both the single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, methods of covering, regulation and means of adjusting the pressure of traps and rolls, consideration of the shoes, the use and regulation of the various types of stop motion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hygroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the reduction of various degrees of felt as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The

manipulation of the various kinds of goods in the mill, viz., all wool, shoddies and mixed goods, is studied in classroom and by operation in the mill.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods both before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and scours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions, and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING, STEAMING, SINGEING AND CRABBING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing, and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year. [Courses II, III, IV, VI, Options G, W, D, S.]

Cotton Finishing—H-31. Preparation: B-12, C-10, D-10, D-24. The outline of the course in the finishing of cotton fabrics is as follows:—

CLOTH ROOM.—Instruction of the various goods and the object thereof; construction of the various types of inspecting and trimming machines.

SHEARING.—The object. A consideration of the various types of shears for treating one or both sides at the same time; also the use of the usual cleaning devices, such as emery, sand and card rolls, beaters and brushes; grinding and the adjustment of the various parts.

The use of brushing and cleaning machines, rolling devices and calender attachments for gray goods.

SINGEING.—Developing and object of singeing; the construction of singers of all types and for various purposes; the use of cooling tanks; steaming devices, rolling and brushing attachments.

Regulation of the flame for various goods, and adjustment of the parts; gas and air pressure, water-cooled rolls; the effect of moisture on the cost of singeing and use of dry cans in connection with singeing; electric singeing.

WASHING.—Open width and string washers, their construction and operation; soaps, temperature, squeeze rolls; washing of various goods and the object thereof; stains.

NAPPING.—The object of napping and the usual method of treating goods; various types of nappers, single and double acting; felting nappers; construction, grinding and adjustments of various types.

WATER MANGLES.—Their objects and the construction of various types; various rolls, iron, husk, etc.; scutchers, their object and constructions.

STARCH MANGLES.—The object and construction of all types of starch mangles for pure starch and filled goods; various types of rolls, brass, rubber, wood; action of doctor blades, etc.; regulation and object of pressure.

Methods of starching and finishing all standard goods, also a consideration of the various substances used, such as starch, softener and fillers; the preparation of starch and various methods of application.

DRYERS AND STRETCHERS.—Both horizontal and vertical types of drying cans, tenter frames, clips, etc.; the swing motion and the finishes thus produced; object and construction of spraying machines, belt stretchers, short tenters, button breakers, etc.

CALENDERS.—The object and construction of all types, including the regulation of pressure and nips for the production of various finishes; various types of rolls and their uses,—steel, husk, cotton, paper, etc., the use of hot and cold rolls; chasing, friction, embossing and Schreiner calenders, and the various finishes produced by each; production of watered effects; beetling machines and hydraulic mangles.

Making-up room,—yarding, inspecting; different types of folds; pressing, papering, marking. [Courses I, III, VI, Options G, C, D, S.]

EQUIPMENT

The equipment of machinery, inventoried at \$458,000.00, is most varied for textile educational purposes, and is being constantly augmented. The builders of the various machines installed keep in close touch with the Institute, adding to the machines such improvements as are made from time to time. This operates to the mutual advantage of student and manufacturer.

Cotton Yarn Department.—The opening and picking section of this department contains a 50-saw Pratt gin used for experimental purposes. For classing work, there is a special section with north light, where Universal Standard Grades, Government Staple Standards, and many different commercial cottons, American and foreign, are available.

The opening and picking equipment consists of one Saco-Lowell Vertical Opener and a 40-inch Saco-Lowell Three Beater Single Process Picker with a Blending Reserve.

The card section has three standard revolving flat top cards, one each from Saco-Lowell, Whitin, and Howard and Bullough shops.

The combing section consists of a sliver lapper, one four-head ribbon lapper, one two-head comb, and one eight-head comb, all from the Whitin Machine Works. There is also one two-head Nasmith comb from John Hetherington and Sons of England.

For drawing, there is a two delivery Howard and Bullough head equipped with metallic rolls and electric stop motion. From the Saco-Lowell Shops, there is a railway head and two four delivery heads, one of which is equipped with a Chapman Neutralizer.

The roving section has a Woonsocket 8 x 4 frame with Whitin Superdraft equipment, a full line of regular roving machines—Slubber Intermediate, Fine and Jack from the Saco-Lowell Shops and a Fine frame from Howard and Bullough.

The spinning equipment is quite varied both with respect to builders and with respect to types and sizes. The Saco-Lowell Shops have supplied five different frames varying from 36 to 216 spindles. They are suitable to spin counts from 3s to 80s. Two are equipped with the latest Saco-Lowell Roth Long-Draft System. A sixth Saco-Lowell frame was supplied by the Acme Machine Company equipped with Chapman Ball-Bearing Spindles. The Whitin Machine Works is represented by five frames on which counts from 3s to over 100s can be spun. One of these frames has an auxiliary equipment of SKF Roller-Bearing Spindles and is fitted on one side with Casablanca Long-Draft equipment. Two of these frames are

the Fales and Jenks type, one of which has 36 spindles with one side equipped with Casablanca Long Draft system. The other is a 72 spindle frame equipped with the latest Whitin Long Draft system. The Howard and Bullough shops have one spinning frame suitable for counts from average to fine. This is equipped with an English type of builder which distinguishes it from the other frames. An Asa Lees Company mule, suitable for counts above 30's, has been retained to illustrate this peculiar type of spinning.

There is one short spooler from the Saco-Lowell Shops. There are two winders from the Foster Machine Company, one for single ends either on cones or tubes, the other for one, two, or three ends parallel wound, especially for preparation for twisting. There is also a one gang Universal No. 50 winder with individual drive suitable for winding ordinary tubes or Franklin Process packages.

The twistors are suitable for all counts. There is one each from the Saco-Lowell, the Howard and Bullough, and the Fales and Jenks Shops. These are all equipped for either wet or dry twisting of average and fine counts. There are two twistors from the Draper Corporation. These are equipped for wet or dry twisting for coarse counts or heavy plies.

To prepare mill wastes for re-use there is one single cylinder roving waste opener and one thread extractor, both from the Saco-Lowell Shops.

The department has a complete coiler waste system as made by the Saco-Lowell Shops, consisting of a 40-inch single coiler side delivery breaker card; a 40-end 20-inch derby doubler; a 40-inch four coiler finisher card and a combination slubber-intermediate. The cards are both equipped with Chapman neutralizers intended to overcome any trouble originating from static electricity.

With the exception of the opening-picking room the humidity in this department is controlled automatically by a system installed by the American Moistening Company. Seven high duty heads supply the necessary moisture and air circulation. An adjustable automatic control regulates the humidity to the desired per cent.

The experimental laboratory is equipped with a power driven skein tester for determining yarn strength and a Moscrop single thread tester for single end strength. There are twist counters for determining the amount of twist and the twist contraction. A scriplane yard winding device and a Saco-Lowell Sliver Tester are used for examining variability of yarns and slivers. For fine work and for fiber study, there is an analytical balance and a Spencer microscope equipped with three objectives, three oculars, ocular micrometer, mechanical stage and Abbé condenser. Other equipment for use in fiber study consists of a Baer Sorter, a hand microtome and projecting apparatus for drawing fiber detail.

Knitting Section.—The winders for this section include a six-spindle No. 50 cone winder, equipped with swifts for winding from skeins, suitable for fine cotton, worsted, silk and rayon yarns, a Payne bobbin winder suitable for coarse woolen, worsted and cotton yarns, and a Foster winder suitable to wind cones or tubes.

Under the group of flat machines there are three Lamb machines, one arranged for knitting gloves and one arranged for knitting sweaters. In addition to these there is also a Grosser sweater machine, a Jacquard machine, and a link and link machine; two Dubied scarf machines, and a Raschel warp knitter.

In the automatic hosiery machine section are included three Banner machines,—220 and 200 needle full hose machines and a 160 needle half hose machine; four Scott & Williams Machines,—a 200 needle B-5, a 220 needle Model K, a 220 needle HH and a 160 needle RI. This section also includes two Acme stationary cylinder machines and a Mayo model C full automatic. For fundamental instruction a Branson 80 needle hand machine is included. For hosiery legs and tops there are five ribbers, made by the Wildman Company, with cylinders varying from 3-5¼ and arranged for needles varying in number from 100-240; two Brinton ribbers, one arranged for 176 needles and the other 200 needles; one Brinton tie machine, 1¾-inch cylinder 100 needles and 49 needles; one Universal Ribber 3½-inch diameter, 160 needles. To illustrate the fully fashioned type of knitting hosiery there is an 18 section, 39 gauge Reading legger, with topping stand.

The underwear machinery consists of a Scott & Williams ribber, a Wildman ribber, a single head Crane spring needle machine and a two head Tompkins spring needle machine. Melting pots and molds are available for leading needles.

For finishing work this section includes a Grosser 2-thread looper, one Hepworth looper, two Beattie loopers, a Soto 20-point looper with an individual table and motor drive; five Union Special sewing machines for overseaming, double stitch covering, seaming and welting and vest finishing; seven Merrow sewing machines, including one shell stitch machine and three overseaming and crocheting machines; three Singer machines; three Wilcox & Gibbs sewing machines, including a flat-lock machine.

The Philadelphia Metal Drying Form Company has installed a table of six forms including men's, women's and children's.

For instruction in the manufacture of braids the New England Butt Company has installed one 24-line Hercules braider, one 12-line braider, one tubular braider, and one soutache braider.

Wool Yarn Department. — The following machinery and equipment is available for use in the manufacture of yarn on the woolen principle.

Installed by Davis & Furber Machine Company: One wool mixing picker equipped with hooper feed (George S. Harwood & Son), one modern 60 x 40 three cylinder set of cards with Garnet Breast, single breaker and double finisher, each driven by Westinghouse variable speed motors through silent Whitney chains, improved Bramwell breaker feed by Harwood & Sons, Davis and Furber Broadband intermediate feed and 80 end four bank single apron tape condenser with all change gears and pulleys; one set 48 x 40 cards with single breaker, intermediate, and finisher cylinders, Bramwell breaker feed, latest type Apperly-Harwood transfer feeds with 40 end ring doffers and two apron condenser; one Model B woolen ring spinning frame, motor driven, with 60 spindles $2\frac{1}{2}$ -inch rings; one 120 spindle spring mule with bobbin holders by the American Bobbin Holder Company; one 20 spindle $2\frac{1}{2}$ -inch ring twister for novelty yarns.

Installed by C. G. Sargent's Sons Corporation: One multiplex burr picker for medium wools, one yarn conditioning machine with motor drive.

Installed by Johnson and Bassett, Inc.: One 120-spindle cam mule complete.

Installed by Torrance Manufacturing Company: One sample mixing card for blending and matching wool.

Installed by B. S. Roy & Son: One card grinding stand with two traverse grinders complete.

Reworked Fiber Division. — Installed by C. G. Sargent's Sons Corporation: One cypress screw acid dip tank; one single apron dryer (baker); one cone carbonizing duster with crush rolls.

Installed by Schaum & Uhlinger, one steam hydro-extractor.

Installed by C. S. Dodge of Lowell, one ball bearing rag picker with condenser, one bagging stand.

Installed by John T. Slack Corporation are many samples of reworked wool in all stages from rags to fiber.

Wool Preparing Division. — Wool sorting and grading is carried on under excellent conditions with the following equipment: sorting bench, baskets, bagging stands.

Installed by C. G. Sargent's Sons Corporation: One grease wool cone duster, one four bowl scouring train with large hopper feed; one single apron dryer with large feeder.

Many samples of all types of wool are available for study.

Top Making Division. — Top for the Bradford or French system is made with the following machinery: One double cylinder worsted card (four licker-in) with can coiler and balling head, complete, by Davis & Furber Machine Company, and with a Bramwell automatic feeder supplied by George S. Harwood & Sons. An electric neutralizer is furnished on card by the Chapman Electric Neutralizer Company. This section also includes a double bowl, 5-cylinder backwasher, with gill box, Taylor-Wordsworth & Co., equipped with blueing motion, oiling motion, and Layland patent pressure motion; a weigh gill box and creel and one doubling balling head gill box (with double screws) made by the Saco-Lowell Shops; two worsted combs with baller punch, one made by Crompton & Knowles, and the second made by James Smith & Sons; two finishing gill boxes, one known as a can gill box and the other a balling head gill box, both made by Hall & Stells.

Worsted Yarn Division.—Bradford or English System: For the manufacture of yarns under the Bradford System of Drawing, Spinning, and Twisting, the following machinery as made by Prince Smith & Son, make up the equipment: one revolving creel for 12 balls, one 2-spindle drawing box, one 4-spindle first finisher, one 12-spindle dandy reducer, one 12-spindle cap frame, one double head can gill box, one 2-spindle gill box, one 2-spindle flyer frame, one 12-spindle ring frame, one 12-spindle 2-fold cap twister, one 12-spindle 6-fold ring twister. One 36-spindle ring spinning frame with motor drive has been installed by Whitin Machine Works. In addition to this the Saco-Lowell Shops have installed the following machinery to carry on similar work: one 2-spindle drawing box, one 6-spindle second finisher, one 24-spindle dandy rover, one 6-spindle cone reducer, one 8-spindle cone rover, one 48-spindle cap spinner, 5-foot end, one 48-spindle cap spinner, 4-foot end, one 48-spindle Boy ring twister. The Lindsay-Hyde Company has installed a modern skein winder.

The humidity in the laboratory as well as in the testing laboratory of the woolen yarns and of the English system of worsted yarns is maintained by the American Moistening Company's system of six humidifiers and four Comin's High Duty heads, under automatic control.

French System.—For the manufacture of worsted yarns under the French System of Drawing and Spinning the machinery was made by the Société Alsacienne de Constructions Mécaniques, and the equipment consists of the following: Model P. L. B. comb with creel for 24 doublings, intersecting gill box (2 heads) equipped with oiling device, gill box (2 heads), first drawing (2 heads), second drawing (2 heads), third drawing (2 heads), reducer (4 porcupines), slubber (8 porcupines), first intermediate (8 porcupines), second intermediate (8 porcupines), rover (8 porcupines), finisher (16 porcupines), self-acting worsted mule (150 spindles).

The Saco-Lowell Shops built and installed a ring spinning frame of 60 spindles for worsted yarns equipped with individual General Electric Company's motor and a Reeves Variable Speed Transmission.

Twenty-one turbo humidifier heads automatically controlled by a humidity regulator have been furnished by the G. M. Parks Company. The compressed air for these heads is supplied by an Ingersoll-Rand 8 by 8 steam-driven air compressor.

Testing Equipment.—For routine mill and research testing a conditioning room is provided which is humidified by G. M. Parks Company equipment.

Testing machines include the following: Henry L. Scott & Company skein and fabric tester; one Emerson conditioning oven with Toledo scales; one Bausch & Lomb projecting microscope for fiber analysis; one Alfred Suter top stapling machine with scales; one top inspection stand with duplex mercury lamp lighting; one Edgerton stroboscope; five copper bowls for scouring by hand; complete set of U. S. wool standards for fiber comparison.

Design and Power Weaving Department.—In the fabric analysis section there have been provided chemical balances made by Volland & Sons and Christian Becker, necessary twist testers, microscopes, reels, etc., as well as a Torsion calculation balance made by the Torsion Balance Company.

In the warp preparation department there has been installed by the Saco-Lowell Shops one of its spoolers, and a slasher for preparing cotton warps; also a high speed warper, by T. C. Entwistle Company. The Whitin Machine Company has supplied a 180-spindle, long chain quiller, and the Johnson & Bassett Company, a quiller of its make. The Universal Winding Company has supplied a winder for cop and bobbin winding and an 8 spindle doubler, also a winder for the high speed warper.

The woolen and worsted warp preparation department contains two 40-end jack spoolers, two spool racks for 12 spools each, one pattern dry frame dresser, one pipe and cylinder dresser, one 60-inch reel, one 82-inch reel, and one double head beamer, all supplied by the Davis & Furber Machine Company.

The Weaving Department contains four looms supplied by the Draper Corporation, which include a plain Northrup, an 8-harness corduroy, an improved Northrup, a Northrup with dobby. The Stafford Loom Company has installed one plain, one cam, one dobby loom and one broad sheeting loom, all equipped with

individual motors; the Whitin Machine Works, a side cam twill, a plain print cloth loom, equipped with Kip-Armstrong electric warp stop motion; Crompton & Knowles Loom Works a jean loom and a plain loom with individual drive. Four of these looms are equipped with Abbott cleavers made by the Abbott Wire and Cast Steel Warp Cleaving Company. The Hopedale Manufacturing Company installed one of its high speed looms with individual motor.

The fancy loom section includes a Stafford Ideal 16-harness automatic shuttle-changing loom, a Whitin 20-harness dobby loom, and the following furnished by the Crompton & Knowles Loom Works: Knowles gingham 4 by 1 boxes, Crompton gingham 4 by 1 boxes, one Crompton towel 2 by 1 boxes, two Terry towel and one huck towel looms, a 20-harness dobby 4 by 1 boxes, fancy leno loom, and a Crompton fancy cotton single cylinder 20-harness dobby.

The woolen and worsted section contains a Knowles 20-harness Gem, a Crompton 24-harness worsted 4 by 4 boxes, a Crompton 6 by 1 double cylinder 20-harness dobby, one heavy 20-harness 4 by 4 boxes, one 20-harness and one 25-harness blanket, seven intermediate woolen 25-harness 4 by 4 boxes and two 90-inch 25-harness heavy woolen looms.

The Jacquard loom section includes one Stafford silk loom, 1,200-hook, Halton head; one 400-hook, single-lift Schaum & Uhlinger Jacquard, mounted for 4-bank, narrow fabric loom; one Skinner Brussels carpet loom, three-quarters wide, equipped with 1,280-hook Jacquard head presented by the Bigelow-Hartford Carpet Company. The Crompton & Knowles Loom Works has furnished one Knowles fancy loom, single-lift Jacquard; one Knowles fancy loom, double-lift Jacquard; one Knowles fancy loom, Jacquard tied up for leno one Knowles loom, 4 by 4 boxes, 54-inch, with 600-hook, double-lift, double-cylinder McMurdo Jacquard head, tied up for damask napkin designs; one Crompton & Knowles 72-inch tapestry loom, with 2,600-hook Halton Jacquard head, one 840-hook, double-lift, single-cylinder Jacquard on Crompton & Knowles 4-bank ribbon loom, one 800-hook, double-lift Knowles Gem silk brocade Jacquard machine, 4 by 4 boxes.

The silk loom section includes one Stafford silk loom, 20-harness dobby, 2 by 1 box motion, sliding bar warp stop motion, filling feeler, extended beam stands, motor drive; one Crompton & Knowles silk loom, 4 by 4 box motion, 20-harness head motion, individual motor drive.

For the purpose of card cutting there has been furnished one Jacquard fine index card-cutting machine by John Royle & Sons; one Jacquard French index card-cutting machine by the same concern.

Chemistry and Dyeing Department.—The Chemistry Laboratory consists of one to give instruction in General Chemistry and Qualitative Analysis and provides facilities to take 120 students. The Quantitative Laboratory takes care of some 50 students and contains the necessary drying closet, steam bath, electrolytic table. The Balance Room has eleven analytical balances made by such concerns as Christian Becker, Eimer & Amend, and H. L. Becker's Sons & Company. The Organic Laboratory has facilities to take care of approximately 25 students having the necessary equipment required in the preparation of basic organic compounds and instruments used in the manufacture of dyes such as autoclaves, electric and gas combustion furnaces.

The Engineering Chemistry Laboratory contains the following equipment: a Becker chainomatic Westphal balance, a Stormer viscosimeter, a Doolittle viscosimeter, an Engler viscosimeter, Saybolt viscosimeters, Pensky-Martin flash tester, Cleveland open cup flash tester, Mahler oxygen bomb calorimeter, Emerson oxygen bomb calorimeters, Parr peroxide bomb calorimeter, Parr sulphur bomb, New York State closed testers, carbon residue apparatus, Orsat flue gas apparatus, Hempel gas analysis apparatus, and the usual chemical apparatus and analytical balances.

The Chemical Textile Testing Laboratory contains the following: a Scott serigraph strength tester, a Scott single strand strength tester, a Freas drying oven and Becker analytical balance for moisture determinations, a mercury arc lamp for ultra violet, a fadeometer, a launderometer, yarn reels, a twist counter, an extraction apparatus, a centrifuge, a Scott regain indicator, a barometer, a Hygrodeik hygrometer, Sling psychrometers, a DuNuoy tensiometer, a Zeiss dipping refrac-

tometer, an Abbé fractometer, a Gaertner spectroscope, a polariscope, a MacBeth color matching lamp, a Mackay cloth oil tester, a Duboscq colorimeter, a Lovibond tintometer, and the usual chemical apparatus and analytical balances.

The Microscopy Laboratory has been equipped with the following: a polarizing chemical microscope, twelve ordinary microscopes, a Minot rotary microtome, a Spencer table microtome, a Zeiss comparison ocular, Chalet lamps, individual lamps, Silvermann illuminators, mechanical stages, dark ground illuminators, a vertical illuminator, a camera lucida, polarizing equipment, an arc lamp, stools, microscope tables, and the usual auxiliaries.

The Microbiology Laboratory contains in addition to microscopes, lamps and other individual equipment, a horizontal gas heated autoclave, a small vertical autoclave, two electric incubators, a sterilamp unit, an electric oven, balances, including a chainomatic analytical balance, and a high vacuum unit for micro-aerophilic experiments. Small equipment such as electric slide warmer, electric hot stage, etc., is also included.

The Photography and Photomicroscopy Laboratory equipment is as follows: Bausch and Lomb horizontal photomicrographic apparatus, Leitz vertical photomicrographic apparatus, Lucas vertical photomicrographic apparatus, Wratten filters, Klieg lamps, dark-room lamps, a projection printer, a graphic camera with focal plane shutter; also much small apparatus such as tanks, trays, washers, etc.

The Chemical Museum has been provided with cases and representative dyestuffs all furnished by various dyestuff manufacturers of this country and abroad. This offers an unparalleled opportunity for students to study and experiment with almost all of the representative dyes which are used in the textile industry.

The Experimental Dyeing Laboratory is equipped with fifty-six steam heated dyeing baths and individual benches, reels and balances. There is also an ageing chamber and a Philadelphia Drying Machinery Company's Hurricane Dryer besides a large collection of dyestuffs.

The Experimental Printing Laboratory is equipped with a power-driven, full-sized, two-roll calico printing machine, and a smaller one-roll, power-driven printing machine, both made by Rice, Barton & Fales, and a small hand-driven, laboratory printing machine, an iron-jacketed steaming chamber, and a set of steam-jacketed copper kettles.

To give instruction in dyeing on a basis which is more comparable with commercial practice there is provided a laboratory which includes the following equipment: a small kier, fitted with E. D. Jefferson's circulating device, a Permutit filter; a mercerizing machine, raw stock and yarn dyeing machines, Klauder-Weldon Dyeing Machine Company; a jig dyeing machine; a set of drying cans; a chain dyeing machine; a raw stock drying table; a padding mangle; a hydro-extractor; a Psarski experimental dyeing machine, a Hussong experimental dyeing machine, equipped for raw stock or yarns, a Rodney Hunt sample piece dyeing machine, equipped with an automatic temperature and pressure-regulating apparatus, made by C. J. Tagliabue Manufacturing Company. The Franklin Process Company has furnished a 25-pound bronze dyeing machine.

Finishing Department.—The Woolen and Worsted section includes a motor-driven Clipper cloth 4-string washer, a fulling mill, and a combination fulling and washing mill for jersey fabrics, furnished by the Rodney Hunt Company; a sample fulling mill, a kicker mill, furnished by James Hunter & Company; an up and down dry gig, a rolling and stretching machine, an up and down wet gig, a steam finishing machine, a 60-inch, 3-burner singeing machine, adapted for cotton, silk or worsted goods, a 2-cylinder double-acting brushing machine. Curtis & Marble Machine Company has furnished a 60-inch 4-cylinder sanding and polishing machine; a mantle steaming and air cooling machine, equipped with a direct connected motor and a Nash pump; and a 66½-inch motor driven, single woolen shear, equipped with list saving motion; a 6-4 double shear, an A. W. C. measuring and weighing machine, furnished by Parks & Woolson; a dewing machine, a 6-4 Voelker rotary press, furnished by G. W. Voelker & Co.; a tentering and drying machine furnished by John Heathcote; a single crabbing machine, H. W. Butterworth & Son; a 72-inch woolen napper donated by Davis & Furber; a 32-inch basket hydro-extractor, W. H. Tolhurst; a Lintz & Eckhardt cloth numbering machine, from Durbrow & Hearne Company; a steam press for underwear, United States Hoffman

Company; a sewing machine, Birch Brothers; a trimming and overseaming machine, The Merrow Machine Company.

The Cotton section includes a 40-inch inspecting and brushing machine, a 44-inch No. 25 railway sewing and rolling machine, a 44-inch cotton shearing machine, Type No. 34, a 44-inch No. 3 steam calender rolling machine, a 40-inch cloth folder, a 40-inch winder and measurer, a set of 44-inch shear blades for grinding purposes, furnished by Curtis & Marble Machine Company; a 48-inch No. 4 opening, sewing and rolling machine, a No. 1 hand power portable railway sewing machine, furnished by Dinsmore Manufacturing Company; a 40-inch 4-tank open soaping machine equipped with patent flushing rolls, brass and rubber squeeze rolls and spiral openers, furnished by Birch Brothers; an 80-inch 24-roll, ball bearing, double acting napper, equipped with a $7\frac{1}{2}$ -horsepower General Electric motor drive, furnished by Davis & Furber (the ball bearings were donated by the Fafnir Bearing Company); a 40-inch, 3-roll water mangle, with husk and brass rolls and usual attachments and equipped with a 48-inch Mycock scutcher, and a 40-inch Mycock cloth expander made by Thomas Leyland & Company; a 40-inch, 2-roll starch mangle, a 40-inch upright drying machine with 10 copper cylinders equipped with Files dry can system; a 40-inch sprinkler, a 40-inch, 5-roll Universal calender with chasing attachment and equipped with a 40-inch Mycock cloth expander, a pasting table with plate, furnished by the Textile-Finishing Machinery Company; a 16 by 24 inch bronze-covered stretcher for the drying cans, C. A. Luther & Company; a 40-inch double bristle stretcher for drying cans, American Finishing Machinery Company; a trimming and overseaming machine, The Merrow Machine Company; a 40-inch Tommy Dodd starch mangle, and a 44-inch, 50-foot vibratory tentering machine, H. W. Butterworth & Sons Company. This machine is directly driven by a $7\frac{1}{2}$ -horsepower variable speed motor and is equipped with a Schwartz automatic electric guider, made by L. H. A. Schwartz & Company.

Engineering Department.—The Steam Engineering Laboratory contains the following equipment arranged for experimental purposes: A 50-horsepower Allis-Chalmers Corliss steam engine direct connected to an Alden absorption dynamometer, and piped to exhaust its steam to the atmosphere, to a Wheeler surface condenser or to the Kerr turbine; a Kerr seven-stage turbine driving directly a 25-kilowatt Richmond Electric Company's alternating current generator and piped to exhaust either to the atmosphere or the condenser. It may be operated either as high pressure or low pressure turbine, and the generator has special connections to illustrate various commercial phases. In addition there are a 4 by 6 Deane triplex power pump, two 2-inch centrifugal pumps made by Lawrence Machine Company, Lawrence, Mass., a Clayton air compressor and necessary tanks, scales and measuring instruments.

The Electrical Engineering Laboratory consists of two sections, one of which is devoted to instruction in the generation and transmission of power, and contains the necessary switchboard and instruments to control a 25-kilowatt alternating current turbo generator and a 15-kilowatt motor generator set arranged to supply either direct or alternating current. In addition there are a 24-horsepower direct current Allis-Chalmers motor and a 10-horsepower direct current General Electric motor, also a 10 and a 7.5 horsepower General Electric alternating current motor besides a General Electric 3-kilowatt rotary transformer and three Westinghouse stationary transformers. The other section is the instrument laboratory and is for the purpose of giving instruction in the measurement of current, voltage, resistance, and in the calibration of instruments. It is supplied with standard alternating and direct current measuring instruments of a wide range of sizes and capacities. A 160 ampere hour storage battery offers a source of constant voltage. A standard Leeds & Northrup photometer with Lummer-Brodhun screen and Macbeth illuminometer provide means of illumination measurements.

Machine Shop.—The equipment of the machine shop is as follows: Four standard engine lathes, 13-inch swing, 6-foot bed, and an engine lathe, 18-inch swing, 10 foot bed; three standard engine lathes, 14-inch swing, 6-foot bed, from Flather & Company; a standard engine lathe, 15-inch swing, 6-foot bed, from F. E. Reed Company; an engine lathe, 18-inch swing, 6 foot bed from Champion Tool Works; a standard engine lathe, 15-inch swing, 6-foot bed, from S. H. Putnam

Sons; one No. 1 Universal milling machine, with all three feeds automatic, from Kemp Smith Manufacturing Company; one 24 by 24 inch, 6-foot planer, from the Mark Flather Planer Company; one 23-inch upright drill, with back gears and power feed, from J. E. Snyder & Son; one 14-inch single sensitive drill, from the Stanley Manufacturing Company; one No. 1 Universal grinder, from Landis Tool Company; five speed lathes, 17-inch swing, 5-foot bed, one 20-inch wet tool grinder, and one 12-inch, 2-wheel dry grinder, from J. G. Blount; an American twist drill grinder, from the Heald Machine Company; one Type 1B portable electric grinder from the Cincinnati Electric Tool Company; one 30-inch grindstone and frame, from the Athol Machine Company; a single spindle centering machine, from D. E. Whiton Machine Company; one 15-inch shaper, from Potter & Johnson; one power hacksaw, from the Fairbanks Company; one cold saw, from John T. Burr & Son; one Eureka metal power saw, Manning, Maxwell & Moore; one Type CC electric drill, Cincinnati Electric Tool Company; one Universal milling attachment for Kemp Smith milling machine, and one Hisey Type B $\frac{1}{2}$ -horsepower tool post grinder, Taylor Machinery Company; one No. 2 Cory bench straightener, Manning, Maxwell & Moore; one No. 3 Universal cutter and reamer grinding machine, Browne & Sharpe; a well-equipped tool room containing a selected stock of the best makes of small tools, such as drills, taps and dies, milling cutters, reamers, gauges, micrometers, etc.

PRIZES AWARDED IN JUNE, 1943

The National Association of Cotton Manufacturers offers a medal to that member of the graduating class who maintains the highest standing throughout his course in Textile Engineering (General or Cotton Option) or the course in Cotton Manufacture. To *Clarence Everett Foster*.

The Proprietors of the Locks and Canals on the Merrimack River Scholarship at Massachusetts Institute of Technology. Several years ago the Proprietors of the Locks and Canals on the Merrimack River, a corporation owning the power rights on the Merrimack River in Lowell, gave to the Massachusetts Institute of Technology a sum of money to provide graduate scholarships to graduates from the Lowell Textile Institute who held a degree and were recommended by the trustees. Applicants must have maintained throughout their undergraduate courses a high scholastic record and must meet the requirements of the Graduate School of the Massachusetts Institute of Technology.

Louis A. Olney Book Prizes.—Prizes in the form of books are awarded each year to the successful candidate on graduation day. The conditions in detail are as follows:—

\$10 to the student graduating from the Chemistry and Textile Coloring course, who, not having already received recognition by appointment as an assistant instructor, shall have maintained the highest scholarship through the course. To *Reinhard George Hochschild*.

\$10 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship during his second year. To *Joseph Hans Rosenbaum*.

\$5 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship during his second year. To *Allen Morris Frank*.

\$10 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship in first-year Chemistry. To *Phyllis Duncan Terret*.

\$5 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship in first-year Chemistry. To *Eleanor Elisabeth Foley*.

STUDENT ACTIVITIES AND ORGANIZATIONS

School Publications.—The Text is issued bi-weekly and it contains news pertaining to activities in the Institute as well as information concerning alumni. The Pickout is an annual publication in charge of a manager and editor selected from the senior class. The board is composed of representatives from the various classes.

Societies.—There are four fraternities, three of which are national and one local, also one sorority. They afford opportunity for social life desired in a college career.

Dramatic Club.—The Dramatic Club gives a theatrical program annually. Appropriation is made from the profits to the treasury of the Athletic Association.

Professional Clubs.—The Textile Engineering Society is composed of all students registered in the Textile Engineering Course. The society holds meetings at which speakers are heard. The Student Chapter of the American Association of Textile Chemists and Colorists sponsors meetings addressed by speakers on technical subjects.

Rifle Club.—The rifle club offers opportunity to all students to attain proficiency in marksmanship and selects the team for interscholastic matches with other colleges.

Honor Society.—To degree candidates who have maintained a high scholarship for three years' work, or who have met with certain similar requirements, is accorded the honor of membership in the society Tau Epsilon Sigma. Relatively a membership in this society corresponds to that in some of the well-known honor societies of the liberal arts and scientific colleges. It requires constant attendance and application to the work of the course for any student to reach the scholarship level entitling him to this membership.

Honor Roll.—The President's List includes upper classmen taking a regular course who have a general average of eighty percent and no deficiencies.

Student Book Store.—A book store is operated on the cooperative plan by the Lowell Textile Associates, Inc., for the benefit and convenience of students who desire to purchase books, supplies, and other materials for use in connection with their work. It is conducted by a manager and two clerks, all of whom are undergraduates. The general business policy is under the control and supervision of a member of the Faculty. Any student may become an associate member of the Lowell Textile Associates, Inc., upon payment of the required fee and is thereby entitled to discount privileges when purchasing from the Book Store and from certain firms in the city of Lowell.

Alumni Association.—The Alumni Association of the Institute holds its annual meeting and banquet in May of each year.

The membership of the association is composed of graduates of the day courses and is open to any non-graduate who has attended the Institute for at least one year.

OFFICERS FOR THE YEAR 1943-44

Hector G. Macdonald, '19, *President*

Carl D. Brandt, '20, *Vice-President*

A. Edwin Wells, '20, *Secretary-Treasurer*

Communications should be addressed to A. Edwin Wells, Lowell Textile Institute.

EXECUTIVE COMMITTEE

Roy H. Bradford, '06

James F. Dewey, '04

Parker F. Dunlap, '34

John G. Echmalian, '16

Edwin D. Fowle, '24

Olin D. Gay, '08

Milton Hindle, '25

Thomas Joy, '26

Edward M. Lynch, '40

Francis P. Madden, '13

Richard W. Rawlinson, '31

Everett B. Rich, '11

Raymond R. Stevens, '19

J. Milton Washburn, Jr., '21

Herbert W. Wilkinson, Jr. '37

GRADUATES OF 1943

BACHELOR OF TEXTILE CHEMISTRY

† ERNEST HERBERT ALLARD
JUAN DE BASTERRECHEA Y A.E.
† IRA FRANCIS BRILLIANT
RALPH LOUIS BULLOCK
† MALCOLM PRESCOTT COULMAN
ESTHER ALICE DAVIS
* PETER DEMALLIE
* THOMAS JOHN GILLICK, JR.
† ROGER CASTLE GRIFFIN, JR.
WILLIAM THOMAS HAGGERTY
† REINHARD GEORGE HOCHSCHILD
PHILIP JOHN HOWARD

†JOHN THOMAS JOHNSON
†WALTER LISIEN
JAMES STANISLAUS MCNELLIS
†JOHN FRANCIS MALLON
*†ALBERT SHERMAN MESSER
LOUIS MARGARET O'LEARY
CLIFFORD ELAIS SCHIFFER
MORTON SCHLESINGER
PAUL HENRY SULLIVAN
†ARTHUR CHARLES TEICHERNER
WALLACE ROLLEY TYRRE

BACHELOR OF TEXTILE ENGINEERING

†RALPH JULIUS BEUTER
†ROBERT WILLIAM FOISY
CLARENCE EVERETT FOSTER
†SAMUEL LLOYD FULLER
*†RICHARD HERBERT GARNETT
†HERBERT ARTHUR GOLDBERG
†ALLAN WILLIAM KELLY
MATTHEW ANTHONY KENNEDY
*†MORTON VICTOR KITTA
*†EDWARD KRINTZMAN

JOHN ANDRE PINATEL
*†EDWARD JOSEPH ROWEN, JR.
†GEORGE MORSE SANFORD, JR. (Lt.)
†HAROLD SIEGEL
*†RAYMOND SILBERSTEIN
†ROBERT H. SILL
*†WILLIAM WARREN TAYLOR
LOUIS JOSEPH VALENTE
††HENRY JOHN ZENORINI

CANDIDATES FOR DIPLOMAS

IN WOOL MANUFACTURE

*ARTHUR TULL FIELDSSEND *JAMES THOMAS WALL
*ALFRED JULIUS WEBER

IN TEXTILE DESIGN

BARBARA TURNER MACDONALD

* Enlisted, inactive duty

† In training

† Tau Epsilon Sigma (Textile Scholastic Society)

REGISTER OF DAY STUDENTS

GRADUATE STUDENTS

<i>Home Address</i>	<i>Lowell Address</i>
COHEN, ISAAC, VI, Istanbul, Turkey B.S., Robert College, 1942	43 Plymouth Street
GRIFFIN, ROGER CASTLE, JR., IV, Needham, Mass. B.T.C., Lowell Textile Institute, 1943	Omicron Pi House
MANDIKOS, GEORGE JOHN, IV, Lowell, Mass. B.T.C., Lowell Textile Institute, 1942	112 Washington Street

UNDERGRADUATE STUDENTS

CANDIDATES FOR DEGREES

Class of 1944

ALPERIN, GEORGE, IV, Bradford, Mass.	
CHAMBERS, EDWARD FRANCIS, VI, Webster, Mass.	Omicron Pi House
COLBURN, JOHN ALLEN, IV, Dracut, Mass.	
DOO, VEE-BING, VI, Shanghai, China	
ECHAVARRIA, ALEJANDRO MAURICIO, VI, Medellin, Colombia, S. A.	15 Douglas Road
FINE, THEODORE, VI, Lowell, Mass.	11 White Street
HARRISON, MAURICE WILLIAM, VI, Lowell, Mass.	18 Bellevue Street
JAY, MILTON JERRY, VI, Lowell, Mass.	19 Mt. Hope Street
KENIN, PHILIP, IV, Lowell, Mass.	11 White Street
MCLEAN, JAMES ARTHUR, VI, Lowell, Mass.	30 Greenfield Street
MARINOPOULOS, CHARLES, VI, Lowell, Mass.	234 Adams Street
MASASCHI, JOSEPH BERNARD, IV, Jamaica Plain, Mass.	
NATH, VIRGINIA LOUISE, VI, Lowell, Mass.	137 Riverside Street
O'LOUGHLIN, HELEN MARY, VI, Lowell, Mass.	Y. W. C. A.
PULIAFICO, CARMELO ROSARIO, IV, Barre Plains, Mass.	562 Westford Street
RABINOWITZ, IRVING MANNY, VI, Lowell, Mass.	59 Crescent Street
RICHARDSON, GEORGE FRANCIS, IV, Lowell, Mass.	50 Standish Street
ROBERTS, DONALD CHESTER, VI, Chelmsford, Mass.	7 Fairmount Street
SIDEBOTTOM, WILLIAM JAMES, IV, Tewksbury, Mass.	
STROMVALL, ERNEST MALCOLM, JR., IV, Lowell, Mass.	27 Hastings Street
WALWOOD, JOHN THOMAS, IV, Lowell, Mass.	144 A Street

Class of 1945

BAUER, JEROME FREDERICK, IV, Waterloo, Ont.	137 Riverside Street
BAUM, BERNARD OSCAR, IV, Brookline, Mass.	
LINT, THEODORE MICHAEL, JR., VI, Lowell, Mass.	43 Plymouth Street
MILGRIM, SIDNEY, IV, Brooklyn, N. Y.	19 Mt. Hope Street
MIRANOWICZ, JOSEPH JOHN, IV, Lawrence, Mass.	
MOSS, WARREN DONALD, VI, New York, N. Y.	43 Plymouth Street
ROSENBAUM, JOSEPH HANS, IV, Lowell, Mass.	617 Westford Street
SCHWARTZ, JOSEPH MICHAEL, VI, Manhattan Beach, Brooklyn, N. Y.	19 Mt. Hope Street
VARON, JOSEPH ESKENAZI, IV, Lima, Peru	9 White Street

Class of 1946

ADAMOPOULOS, LEWIS, IV, Haverhill, Mass.	
FOLEY, ELEANOR ELIZABETH, IV, Lowell, Mass.	120 Fulton Street
FRANKLIN, AMY-ADELE, VI, Lowell, Mass.	17 Columbia Street
LANDRY, RITA PEARL, IV, Lowell, Mass.	348 Hildreth Street

Home Address

LOREDO, JESUS DE BLAS, VI, San Luis Potosi, Mexico
 MEISTER, KENNETH HAROLD, IV, Maynard, Mass.
 SCHWARTZ, GERALD GORDON, VI, New York, N. Y.
 TAMASAUSKAS, ALBERT EDWARD, IV, Lowell, Mass.

Lowell Address

831 Merrimack Street
 574 Central Street

Class of 1947

BECHARD, ROBERT WILLIAM, IV, Tyngsboro, Mass.
 BERNARD, JOHN JOSEPH, IV, Lowell, Mass.
 DE MELLO, ROBERTO BRITO BEZERRA, VI,

Rio de Janeiro, F.D., Brazil

DIAMOND, KENNETH, VI, New York, N. Y.
 GAULIN, BLANCHE ANNETTE, VI, Lowell, Mass.
 GLADE, NATHANIEL HENRY, IV, Fall River, Mass.
 HIRD, KENNETH, VI, Methuen, Mass.

IVES, ESTELLE MARIE, IV, Tewksbury, Mass.

LEVIN, MADELINE, IV, Lowell, Mass.

LEVY, LEONARD, VI, New York, N. Y.

MACINTYRE, ROBERT GARDINER, VI, Lowell, Mass.

MITCHELL, RICHARD BARNES, IV, Wellesley Hills,
 Mass.

MORRIS, DONNA LOUISE, IV, Lowell, Mass.

NYSTROM, FREDERICK WALTER, VI, West Chelmsford,
 Mass.

PORTER, ROBERT ELLIS, VI, Framingham, Mass.

RIORDAN, PAULINE FRANCES, IV, Lowell, Mass.

SAMPERIL, ALBERT OSHA, VI, Providence, R. I.

SARGENT, ANN EILEEN, IV, Lowell, Mass.

SEGALL, WILLIAM MARTIN, IV, Lowell, Mass.

WILKINSON, MARY RUTH, IV, North Andover, Mass.

WOODBURN, EDGAR SHERMAN, VI, Methuen, Mass.

YANES, ARTHUR SELIG, VI, Brookline, Mass.

999 Moody Street

137 Fletcher Street

50 Standish Street

429 Pawtucket Street

137 Riverside Street

43 Ware Street

246 Andover Street

32 Berkeley Avenue

Omicron Pi House

40 Livingston Avenue

50 Standish Street

21 Orchard Street

142 Riverside Street

24 Maude Street

111 Luce Street

Omicron Pi House

DIPLOMA STUDENTS**Class of 1944**

GARCIA, JULIO, II, Santiago, Chile

GUIMARAES, PAULA MOURAO, I, Rio de Janeiro, Brazil

15 Douglas Road

831 Merrimack Street

Class of 1945

BAGGESEN, ALVAN FREDERICK, II, Concord, Mass.

BOMBARA, FRANCIS JEROME, II, East Douglas, Mass.

28 Riverside Street

Class of 1946

BORGES, MILTON VELLOZO, I, New York, N. Y.

NALBANDIAN, ARCHAVIR MELKONIAN, II, Santiago,
 Chile

URIASTE, IGNACIO, I, SANTIAGO, Chile

142 Riverside Street

9 White Street

15 Douglas Road

Specials

DONOVAN, DANIEL GIBBONS, III, Milton, Mass

FIELD, LESLIE ADELBERT, JR., III, Lowell, Mass.

MATHIESON, ROSA FRANCES, III, Jamaica Plain, Mass.

O'NEIL, FRANK JAMES, VI, Lawrence, Mass.

PARSONS, BRACKETT, VI, Wellesley Hills, Mass.

RICKETTS, JOSE GUILLERMO, II, Arequipa, Peru

RYSLNIK, JOHN GEORGE, III, Hillsboro, N. H.

230 Princeton Boulevard

15 Douglas Road

Y. M. C. A.

ALPHABETICAL LIST OF GRADUATES

Master of Science degree was first given in 1936. Other degrees were issued beginning with the year 1913 as follows: B.T.C.—Bachelor of Textile Chemistry; B.T.D.—Bachelor of Textile Dyeing; B.T.E.—Bachelor of Textile Engineering. A diploma is indicated by D and a certificate (covering a partial course only) by C.

The following list has been corrected in accordance with information received previous to February 1, 1944. Any information regarding incorrect or missing addresses is earnestly solicited.

A

- Abbot, Edward Moseley, II, '04 (D).**
President and General Manager, Abbot Worsted Co., Graniteville, Mass.
- Abbott, George Richard, II, '08 (D).**
Tree Warden, Andover, Mass.
- Acar, Ibrahim Zeki, VI, '38 (M.S.).**
General Textile Engineer, Malatya Textile Mills, Malatya, Turkey.
- Adams, Floyd Willington, VI, '16 (B.T.E.).**
- Adams, Henry Shaw, I, '05 (D).**
Assistant Treasurer, The Springs Cotton Mills, Lancaster, S. C.
- Adams, Tracy Addison, IV, '11 (D).**
Consulting Engineer, Barnes Textile Associates, 10 High Street, Boston, Mass.
- Adie, Donald Miles, VI, '41 (B.T.E.).**
Ensign, USNR (Missing in action).
- Aigen, Lawrence, VI, '40 (B.T.E.).**
Inspector of Textiles, U. S. Army Quartermaster Depot, Philadelphia, Pa.
- Albrecht, Charles Henry, IV, '17 (B.T.C.).**
Chief Chemist, Atlantic Mills, Providence, R.I.
- Alexander, Gerard, VI, '41 (B.T.E.).**
Lt., U. S. Marine Corps.
- Allard, Edward Joseph, IV, '31 (B.T.C.).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corp., Providence, R. I.
- Allard, Ernest Herbert, IV, '43 (B.T.C.).** Lieut., U. S. Army.
- Allen, Grover Stanley, IV, '34 (B.T.C.).**
U. S. Army
- Almquist, George John Edwin, I, '19 (D).**
Second Vice-President, Passaic-Bergen Lumber Company, Passaic, N. J.
- Anderson, Arthur Ilman, IV, '24 (B.T.C.).**
Textile Chemist, Superintendent of Research, American Institute of Laundering, Joliet, Ill.
- Anderson, Arthur Julius, IV, '19 (B.T.C.).**
Salesman, National Aniline Division, Allied Chemical & Dye Corp., 40 Rector St., New York, N. Y.
- Anderson, Clarence Alfred, VI, '25 (B.T.E.).**
Cost Accountant, Hathaway Mfg. Company, New Bedford, Mass.
- Anderson, Harold Robert, II, '26 (D).**
With Abbot Worsted Company, Forge Village, Mass.
- Annan, David, II, '23 (D).**
- Anthony, Henry Steere, Jr., IV, '36 (B.T.C.).**
Lieutenant, Chemical Warfare Service, U. S. Army.
- Appel, Mrs. Bessie L. (Liffand, Bessie) IV, '32 (B.T.C.).**
Assistant Chemist, Massachusetts Kitting Mill, Jamaica Plain, Mass.
- Arienti, Peter Joseph, IV, '10 (D).**
Chief Chemist and Superintendent of Dyeing, Sayles Finishing Plants, Inc., Saylesville, R. I.
- Arundale, Henry Barnes, II, '07 (D).**
48 Tremont Street, Malden, Mass.
- Atwood, Henry Jones, II, '23 (D).**
Agent, Amos Abbott Company, Dexter, Me.
- Babigan, Edward, IV, '33 (B.T.C.).**
With Outlet Fruit Company, Lowell, Mass.
- Babigan, Raymond, IV, '24 (B.T.C.).**
Examiner, U. S. Patent Office, Richmond, Va.
- Bacheider, Charles Edward, IV, '24 (B.T.C.).**
Superintendent of Acetate Yarn Division, Tennessee Eastman Corporation, Kingsport, Tenn.
- Baer, Leonard Herman, VI, '42 (B.T.E.).**
Capt., U. S. Army Air Corps.
- Bagshaw, Herbert Arthur Edward, VI, '32 (B.T.E.).**
Time Study Department, Worsted Division, Pacific Mills, Lawrence, Mass.
- Bailey, Lester Harold, IV, '24 (B.T.C.).**
Captain, Chemical Warfare Service, Edgewood Arsenal, Md.
- Bailey, Walter James, IV, '11 (D).**
Bailey's Cleansers and Dyers, Watertown, Mass.
- Baker, Franz Evron, VI, '26 (B.T.E.).**
Mill Superintendent, Hampshire Woolen Co., Ware, Mass.
- Baker, Maurice Sidney, IV, '25 (B.T.C.).**
Merchant, Baker's Dress Goods Shop, Norwood, Mass.
- Baker, Phyllis Jeanne, VI, '39 (B.T.E.).**
Textile Analyst, Laboratory Division, Warwick Mills, Boston, Mass.
- Baker, William John, IV, '16 (D).**
Manufacturing Superintendent, E. I. du Pont de Nemours & Co. Old Hickory, Tenn.
- Balch, Ralph Herman, VI, '29 (B.T.E.).**
Development Engineer, Celanese Corporation of America, Cumberland, Md.
- Baldwin, Frederick Albert, II, '04 (D).**
President, Federal Clothing Manufacturing Company, Ltd., Sherbrooke, Que.
- Banta, John Garrett, VI, '39 (B.T.E.).**
Lieutenant, U. S. Naval Air Corps.
- Bard, Morry Arnold, IV, '30 (B.T.C.).**
President and Textile Chemist, Silver Line Dye Works, Inc., New York City.
- Bardzik, Thaddeus, IV, '41 (B.T.C.).**
Junior Chemist P-1, U. S. Army Quartermaster Depot, Philadelphia, Pa.
- Barlowsky, Archie, VI, '17 (B.T.E.).**
Attorney at law, Barlowsky & Barlowsky, Lowell, Mass.
- Barr, I. Walwin, I, '00 (D).**
Secretary, Buckley Brothers Company, Inc., 881 Broadway, New York City.
- Barrett, Andrew Edward, IV, '23 (B.T.C.).**
Field Engineer, Armour & Co., Chicago, Ill.
- Barry, Leo Joseph, II, '27 (D).**
With Bell Company, Worcester, Mass.
- Barry, Marie Gertrude, IV, '32 (B.T.C.).**
- Basdikis, Charles Apostolos, IV, '36 (B.T.C.).**
Electrical Designer, Stone & Webster Engineering Corporation, Boston, Mass.
- Bassett, Louis Loss, VI, '37 (B.T.E.).**
Manufacturer, Glenbarb Fabrics, Lowell, Mass.
- Basterrechea, Juan de, IV, '43 (B.T.C.).**
Havana, Cuba—Lamparilla No. 1.
- Batcheller, Ben Pitman, VI, '41 (B.T.E.).**
A. A. F. Glider Pilot.
- Bates, Wesley Elliott, VI, '36 (B.T.E.).**
Methods Engineer, American Bosch Corporation, Springfield, Mass.
- Bauer, Frank Norbert, I, '39 (D).**
Superintendent, Bauer's Ltd., Waterloo, Ont.
- Bauer, Harold Conrad, III, '28 (D).**
Army Air Base, Maxton, N. C.

B

- Babb, Charles Wilkes, Jr., II, '31 (D).**
Superintendent, Knox Woolen Company, Camden, Me.

- Beattie, John Silas, IV, '35 (B.T.C.).**
Chemist, American Viscose Corporation,
Marcus Hook, Pa.
- Beauregard, Albert Joseph, VI, '39 (B.T.E.).**
Engineer Draftsman, Grumman Aircraft En-
gineering Corp., Bethpage, L. I.
- Beck, Frederic Christian, II, '24 (D).**
In business. Weld & Beck, Southbridge, Mass.
- Beeman, Earl Royal, VI, '30 (B.T.E.).**
Superintendent, Amoskeag-Lawrence Mills,
Manchester, N. H.
- Beigbeder, Edgar Raymond, IV, '34 (B.T.C.).**
Colorist, National Aniline Division, Allied
Chemical & Dye Corporation, Buffalo, N. Y.
- Bell, Edward Benjamin, IV, '24 (B.T.C.).**
Chemist, Calgon, Inc., Lowell, Mass.
- Beltrami, Kenneth Charles, VI, '40 (B.T.E.).**
With Deering-Milliken Co., New York, N. Y.
- Bennett, E. Howard, II, '03 (C).**
Publisher, American Wool and Cotton Re-
porter, 530 Atlantic Avenue, Boston, Mass.
- Bentley, Byron, II, '26 (D).**
Superintendent and General Manager, Joseph
Bentley Hair Company, Methuen, Mass.
- Bergeron, Alvin Wilfred, IV, '29 (B.T.C.).**
Chemist, Celanese Corporation of America,
Amccle, Md.
- Berry, Wilbur French, II, '17 (D).**
Superintendent, Thomas Kay Woolen Mill,
Salem, Oreg.
- Bertrand, Arthur Leon, IV, '32 (B.T.C.).**
Cpl., Radio Technician, U. S. Army Air Corps,
Overseas.
- Bethel, Ion Maywood, VI, '39 (M.S.) (B.S.,
Texas Agricultural and Mechanical Col-
lege, 1925).**
Major, U. S. Marine Corps, Officer in Charge
of Inspection, Philadelphia, Pa.
- Beuter, Ralph Julius, VI, '43 (B.T.E.).** Lieut.,
U. S. Army Air Corps.
- Blenstock, George Jerrard, III, '24 (D).**
51 Madison Avenue, New York, N. Y.
Stylist and General Manager for George
Mabbett & Sons Company of Plymouth,
Mass. and Shetucket Worsted Mills of Baltic,
Conn.
- Billings, Borden Dickinson, I, '29 (D).**
- Bird, Clarence Henry, II, '22 (D).**
Superintendent, Cocheo Woolen Manufac-
turing Company, East Rochester, N. H.
- Bird, Francis John, VI, '22 (B.T.E.).**
Attorney-at-Law, 227 Bronson Building,
Attleboro, Mass.
- Birtwell, John Lincoln, IV, '34 (B.T.C.).**
Staff Sgt., 19th Weather Squadron, U. S. Air
Corps, Overseas.
- Blaikie, Howard Mills, II, '11 (D).**
- Blake, Parker Gould, VI, '14 (D).**
Salesman, G. Whitaker & Co., Ltd., Peter-
borough, Ont.
- Blanchard, Armand Eugene, III, '41 (D).**
Lieut., U. S. Army Ordnance Depot, San
Antonio, Texas.
- Blanchard, John Lawrence, II, '23 (D).**
- Bogdan, John Francis, VI, '35 (B.T.E.).**
Overseer, Manville Jenckes Corporation,
Manville, R. I.
- Bone, Arthur Peter Stuart, VI, '39 (B.T.E.).**
Ensign, USNR.
- Booth, James Mooney, IV, '24 (B.T.C.).**
Technical Sales, The Huron Milling Company,
9 Park Place, New York City.
- Bordett, Sidney Morris, VI, '37 (B.T.E.).**
U. S. Army Air Force—Signal Corps.
- Bottomley, John, III, '28 (D).**
Assistant Technician, Joshua L. Bailey & Co.,
40 Worth Street, New York City.
- Boule, George Raymond, IV, '42 (B.T.C.).**
Ensign, USNR
- Boyd, William, Jr., IV, '40 (B.T.C.).**
Ensign, USNR.
- Boynton, Bradford Lewis, II, '35 (D).**
Volunteer Officer Candidate, U. S. Army.
- Bradford, Edward Hosmer, VI, '35 (B.T.E.).**
Assistant Overseer of Carding, Manville-
Jenckes Corporation, Manville, R. I.
- Bradford, Harold Palmer, II, '25 (D).**
- Bradford, Roy Hosmer, II, '06 (D).**
Appraiser, Reconstruction Finance Corpora-
tion, 40 Broad St., Boston, Mass.
- Bradford, William Swanton, VI, '31 (B.T.E.).**
U. S. Commissioner of Conciliation, Depart-
ment of Labor, Washington, D. C.
- Bradley, Raymond Frost, VI, '14 (D).**
Garage Proprietor, Twin Light Garage, 267
East Main Street, Gloucester, Mass.
- Bradley, Richard Henry, V, '01 (C).**
Gasoline Salesman, Fairhaven, Mass.
- Brainerd, Arthur Travena, IV, '09 (D).**
Manager, Ciba Company, Inc., 325 West
Huron Street, Chicago, Ill.
- Brainerd, Carl Emil, IV, '20 (B.T.C.).**
Dyer, F. C. Huyck & Sons, Albany, N. Y.
- Brandt, Carl Dewey, VI, '20 (B.T.E.).**
Director of Research, Whitin Machine Works,
Whitinsville, Mass.
- Brannen, Leon Vincent, III, '07 (C).**
- Brantman, Jackson Agmor, VI, '39 (B.T.E.).**
1st Lieut., U. S. Army.
- Brickett, Raymond Calvin, II, '14 (D).**
Overseer, M. T. Stevens & Sons Company
(Marland Mills), Andover, Mass.
- Bridges, Herbert Gardner, II, '34 (D).**
Manager and Representative, The New Hamp-
shire Company, Portsmouth, N. H.
- Brigham, Howard Mason, VI, '24 (B.T.E.).**
Sales and Manufacturing Executive, Well-
ington, Sears Co., 65 Worth Street, New York
City.
- Brilliant, Ira Francis, IV, '43 (B.T.C.).**
U. S. Army.
- Broadhurst, Russell Denton, IV, '38 (B.T.C.).**
Chief Dyer, Russell Manufacturing Co.,
Middletown, Conn.
- Bronson, Howard Seymour, II, '27 (D).**
Overseer of Knitting, Portage Hosiery Com-
pany, Portage, Wis.
- Brook, George Henry, II, '42 (D).**
Asst. to Manager, Brook Woolen Company,
Simcoe, Ont.
- Brook, John Frederick, VI, '42 (B.T.E.).**
Lieut., Royal Canadian Artillery.
- Brooks, Raymond King, Jr., VI, '41 (B.T.E.).**
Chas. W. House & Sons, Inc., Unionville, Conn.
- Brosnan, William Francis, IV, '27 (B.T.C.).**
Superintendent, F. P. Maupai Dyeing Co.
Inc., West New York, N. J.
- Brown, Gerald Marston, VI, '22 (B.T.E.).**
Superintendent, Worsted Top and Yarn Divi-
sion, Botany Worsted Company, Passaic, N. J.
- Brown, Needham Ballou, Jr., VI, '41 (B.T.E.).**
Asst. Superintendent, Cowan Mill, Lewiston,
Me.
- Brown, Philip Franklin, II, '23 (D).**
Assistant Sales Director, E. I. du Pont de
Nemours, Rayon Division, Wilmington, Del.
- Brown, Rollins Goldthwaite, IV, '12 (D).**
Representative, Saco-Loell Shops, Biddeford,
Me.
- Brown, Russell Lee, VI, '21 (B.T.E.). '40 (M.S.).**
Professor of Textiles; in charge Department of
Woolen Yarns, Lowell Textile Institute,
Lowell, Mass.
- Brown, Will George, Jr., IV, '22 (B.T.C.).**
Sales Engineer, Wallerstein Company, 180
Madison Avenue, New York City.
- Buchan, Donald Cameron, II, '01 (D).**
Assistant Superintendent, M. T. Stevens &
Sons Company, North Andover, Mass.
- Buchan, Norman Spaulding, IV, '26 (B.T.C.).**
Textile Chemist, Newmarket Manufacturing
Company, Lowell, Mass.
- Buck, Roy Garvin, Lt. Comdr. (S.C.) U.S.N.,
VI, '41 (M.S.). (B.S., 1933, U. S. Naval
Academy.)**
Officer in Charge of Purchase, Research and
Control Sections, Navy Department, Wash.
D. C.
- Buckley, Herman Timothy, IV, '39 (B.T.C.).**
U. S. Army.
- Bukala, Mitchell John, IV, '34 (B.T.C.).**
Chemist, Massachusetts Mohair Plush Com-
pany, Lowell, Mass.
- Bullock, Merlen Clarke, VI, '40 (B.T.E.).**
Textile Technician, B. F. Goodrich Co.,
Akron, Ohio.
- Bullock, Ralph Louis, IV, '43 (B.T.C.).**
U. S. Army.
- Bulson, Douglas Whitney, VI, '42 (B.T.E.).**
Engineer, Mechanical Department, U. S.
Rubber Co., Naugatuck, Conn.

- Burbeck, Dorothy Maria, IV, '20 (B.T.C.).**
See Garlick, Mrs. Dorothy M.
- Burger, Samuel Joseph, III, '24 (D).**
Textile Consultant, 50 East 42nd St., New York, N. Y.
- Burke, James Edward, Jr., IV, '34 (B.T.C.).**
Police Officer, Lowell Police Department, Lowell, Mass.
- Burnham, Frank Erwin, IV, '02 (D).**
Largo, Florida.
- Burns, Robert, IV, '28 (B.T.C.).**
- Burt, Joseph Frederic, VI, '31 (B.T.E.).**
Assistant to Superintendent, Abbot Worsted Company, Forge Village, Mass.
- Buzzell, Harry Saville, VI, '29 (B.T.E.).**
Supervisor, Oxford Paper Company, Rumford, Maine.

C

- Caine, Philip Daniel, IV, '42 (B.T.C.).**
Ensign, U. S. Naval Reserve
- Calder, Marian Brownson, VI, '37 (M.S.).** See Sigel, Mrs. A. E.
- Callahan, John Joseph, Jr., II, '26 (D).**
- Cameron, Elliott Francis, IV, '11 (D).**
Attorney-at-law, Willard, Allen and Mulkern, 100 Milk Street, Boston, Mass.
- Campbell, Alexander, VI, '23 (B.T.E.).**
Plant Engineer, Arlington Mills, Lawrence, Mass.
- Campbell, Allan, Jr., VI, '32 (B.T.E.).**
With A. & A. Campbell Co., West Roxbury, Mass.
- Campbell, Andrew Morris, IV, '40 (B.T.C.).**
U. S. Coast Guard.
- Campbell, Louise Porter, IIIB, '03 (C).**
With Ginn & Co., Boston, Mass.
- Campbell, Orison Sargent, II, '03 (D).**
Felt Salesman, E. F. Walters Co., Reg'd., Toronto, Ont.
- Cannell, Philip Stuart, VI, '23 (B.T.E.).**
Hotel Proprietor, Carlton Hotel, Malden, Mass.
- Carbone, Alfred John, IV, '31 (B.T.C.).**
Chemist and Colorist, Sandoz Chemical Works, Philadelphia, Pa.
- Carleton, Joseph Raddin, III, '30 (D).**
Manager, Defense Division, Bridgeport Fabrics, Inc., Bridgeport, Conn.
- Carmichael, Robert Dana, VI, '42 (B.T.E.).**
Project Engineer, Aircraft Fuel Cells, U. S. Rubber Co., Naugatuck, Conn.
- Carr, Paul Edward, II, '24 (D).**
Assistant General Manager, L. C. Chase & Co., Inc., 295 Fifth Avenue, New York City.
- Carter, Mrs. Dorothy E. (Lewis, Dorothy E.) VI, '41 (B.T.E.).**
324 North Main St., Woonsocket, R. I.
- Carter, Russell Albert, II, '25 (D).**
Textile Engineer, Hampton Company, Easthampton, Mass.
- Cary, Julian Clinton, VI, '10 (D).**
Resident Secretary, The American Mutual Liability Insurance Company, 15 Lewis Street, Hartford, Conn.
- Casey, Francis Harold, IV, '31 (B.T.C.).**
Demonstrator, Sandoz Chemical Works, Inc., Boston, Mass.
- Caya, Ferdinand Joseph, IV, '22 (B.T.C.).**
Superintendent, Falls Yarn Mills, Woonsocket, R. I.
- Chace, William George, Ph.B., IV, '42 (M.S.).**
(Ph.B., Brown University, 1926).
Lieut. (j.g.) USNR.
- Chamberlin, Frederick Ellery, I, '03 (D).**
Overseer of Spinning, Monument Mills, Housatonic, Mass.
- Chandler, Proctor, IV, '11 (D).**
With Packard Mills of Webster, at Caryville, Mass.
- Chang, Chi, VI, '23 (B.T.E.).**
- Chang, Wen Chuan, VI, '21 (B.T.E.).**
1601 V Street, N. W., Washington, D. C.
- Chapman, Mrs. Boyd P., Jr. (O'Donoghue, Eileen Margaret) VI, '39 (B.T.E.).**
515 S B S, Galveston, Texas.
- Chapman, Leland Hildreth, VI, '24 (B.T.E.).**
Director of Guidance, School Department, Hingham, Mass.
- Chen, Shih Ching, IV, '22 (B.T.C.).**
- Chen, Wen-Pei, IV, '24 (B.T.C.).**
Chen-Fu Cotton Mill, Shanghai, China.
- Church, Charles Royal, II, '06 (C).**
Box 351, Lemon Grove, Calif.
- Clark, Earl William, IV, '18 (B.T.C.).**
Research Chemist, National Aniline Division, Allied Chemical and Dye Corporation, Buffalo, N. Y.
- Clark, Thomas Talbot, II, '10 (D).**
President and Treasurer, Talbot Mills, North Billerica, Mass.
- Clarke, George Dean, II, '21 (C).**
- Clayton, Harold Edmund, VI, '21 (B.T.E.).**
Treasurer and Manager, Clayton Hosiery Mills, Inc., Lowell, Mass.
- Cleary, Charles Joseph, II, '13 (D).**
Principal Materials Engineer, United States Army Air Corps, Dayton, Ohio.
- Clement, David Scott, IV, '24 (B.T.C.).**
Overseer of Dyeing, Nashua Manufacturing Company, Nashua, N. H.
- Cleveland, Richard Sumner, VI, '30 (B.T.E.).**
Major, U. S. Army, Office of the Quartermaster General, Washington, D. C.
- Clifford, Albert Chester, VI, '22 (B.T.E.).**
Textile Engineer, Western Electric Company, Inc., Kearny, N. J.
- Clogston, Raymond B., IV, '04 (D).**
Superintendent of Dyeing, Merrimack Manufacturing Company, Lowell, Mass.
- Cluett, John Girvin, I, '29 (D).**
Acting Superintendent, Cluett, Peabody & Co., Inc., Troy, N. Y.
- Coan, Charles Bisbee, IV, '12 (D).**
Salesman and Demonstrator, American Aniline Products Company, Boston, Mass.
- Cobb, Joseph Calvin, VI, '36 (B.T.E.).**
Office Manager and Representative, Middlesex Paper Tube Company of New Jersey, Trenton, N. J.
- Cobin, Arthur Edward, IV, '23 (B.T.C.).**
With National Hosiery Dyeing and Finishing Works, Boston, Mass.
- Coffey, Daniel Joseph, III, '28 (D).**
Blanket Inspector, F. C. Huyck & Sons, Rensselaer, N. Y.
- Coffin, William Burton, IV, '42 (B.T.C.).**
With National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Cohen, Leonard Lee, II, '39 (D).**
Designer, S. Stroock & Co., Newburgh, N. Y.
- Cohen, Raphael Edvab, IV, '25 (B.T.C.).**
Sales Manager, Merrimack Paper Tube Company, Inc., Lowell, Mass.
- Colby, J. Tracy, VI, '16 (D).**
Sales Manager, F. C. Huyck & Sons, Albany, N. Y.
- Colby, Vernon Warren, IV, '40 (B.T.C.).**
U. S. Army.
- Colby, Willard Alvah, Jr., IV, '30 (B.T.C.).**
With Hanes Dye & Finishing Co., Winston-Salem, N. C.
- Cole, Edward Earle, IV, '06 (D).**
Manager, Haverhill Credit Bureau, Haverhill, Mass.
- Collonan, Herbert Joseph, II, '22 (D).**
With Potter & Collonan, Moosup, Conn.
- Coman, James Groesbeck, I, '07 (D).**
General Manager, Mexia Textile Mills, Mexia, Texas.
- Conant, Harold Wright, I, '09 (D).**
Treasurer, United Elastic Corporation, Easthampton, Mass.
- Conant, Richard Goldsmith, I, '12 (D).**
Vice-President in charge of Colored Goods, Wellington, Sears Company, 65 Worth Street, New York City.
- Condon, John Andrew, Jr., IV, '41 (B.T.C.).**
2d Lieut., U. S. Air Corps.
- Conklin, Jennie Grace, IIIB, '05 (C).**
See Nostrand, Mrs. William L.
- Connolly, Daniel Francis, Jr., VI, '35 (B.T.E.).**
U. S. Inspector of Textiles, Quartermaster Department, Boston, Mass.
- Connor, Thomas Francis, II, '28 (D).**
Court Officer, Superior Court, Suffolk County, Boston, Mass.
- Connorton, John Joseph, III, '27 (D).**
Lieutenant, Chemical Warfare Service, U. S. Army.

- Cook, Kenneth Bartlett, I, '13 (D).**
Vice-President in Charge of Manufacturing,
Manville-Jenckes Company, Manville, R. I.
- Cooper, Harlan Cyril, VI, '41 (M.S.). (B.S.**
1931, U. S. Naval Academy.)
Captain, Asst. O. I. C. Testing Laboratory,
U. S. Marine Corps Depot, Philadelphia, Pa.
- Corbett, James Francis, IV, '28 (B.T.C.).**
Chemist, Technical Control Department,
Pacific Mills, 214 Church Street, New York,
N. Y.
- Corcoran, Leonard Robert, IV, '42 (B.T.C.).**
U. S. Army, Quartermaster Corps, University
of Tulsa, Tulsa, Okla.
- Cote, Theodore Charles, IV, '26 (B.T.C.).**
Captain, Medical Administration Corps, U. S.
Army.
- Coulman, Malcolm Prescott, IV, '43 (B.T.C.).**
Lt., U. S. Army Air Corps.
- Cowan, Raymond Bernard, IV, '35 (B.T.C.).**
Of Cowan & Shain, Haverhill, Mass.
- Craig, Albert Wood, IV, '07 (D).**
Manager, Windsor Print Works, North Adams,
Mass.
- Craig, Clarence Eugene, III, '02 (D).**
1730 Centre Street, West Roxbury, Mass.
- Crane, Eugene Francis, II, '33 (D).**
With East Weymouth Wool Scouring Com-
pany, East Weymouth, Mass.
- Crawford, Robert Thomas, VI, '36 (B.T.E.).**
Assistant Superintendent, Acetate Staple De-
partment, Tennessee Eastman Corporation,
Kingsport, Tenn.
- Creese, Guy Talbot, IV, '14 (D).**
General Manager, Creese & Cook Company,
Danversport, Mass.
- Crowe, Joseph Bailey, IV, '25 (B.T.C.).**
Director of Laundry and Textile Research,
Procter & Gamble Co., Ivorydale, Ohio.
- Culver, Ralph Farnsworth, IV, '04 (D).**
Manager and Director, Ciba Company, Inc.,
61 Peck Street, Providence, R. I.
- Cummings, Edward Stanton, VI, '16 (D).**
Industrial Engineer, Ralph E. Loper Company,
Greenville, S. C.
- Curran, Charles Ernest, III, '02 (C).**
Head Designer, Wood Worsted Mills, Law-
rence, Mass.
- Currier, John Alva, II, '01 (D).**
Mechanical Superintendent, M. T. Stevens &
Sons Co., North Andover, Mass.
- Curtin, William John, IV, '35 (B.T.C.).**
District Manager, Lowell Sun, Lowell, Mass.
- Curtis, Frank Mitchell, I, '06 (D).**
19A Forest Street, Cambridge, 40, Mass.
- Curtis, William Leavitt, II, '05 (C).**
- Cutler, Benjamin Winthrop, Jr., III, '04 (D).**

D

- Daley, Charles Lincoln, IV, '34 (B.T.C.).**
Instructor, Chemistry Department, Lowell
Textile Institute, Lowell, Mass.
- Dalton, Gregory Smith, IV, '12 (D).**
- Daly, William James, VI, '37 (B.T.E.).**
Senior Inspector of Textiles, Boston Quar-
termaster Depot, Boston, Mass.
- Darby, Avarad Nelson, II, '28 (D).**
Manager, Merrimac Hat Corporation, Green-
ville, Ala.
- Datar, Anant Vithal, VI, '24 (B.T.E.).**
Managing Director, Venkatesh Rang Tantu
Mills, Inchalkaranji, S. M. Cy., India.
- Davidson, Sydney, III, '28 (D).**
- Davieau, Alfred Edward, VI, '16 (D).**
Manager, Engineering and Research Division,
United States Testing Company, Inc., 1415
Park Avenue, Hoboken, N. J.
- Davieau, Leon Arthur, VI, '23 (B.T.E.).**
Textile Technologist, United States Rubber
Company, Passaic, N. J.
- Davis, Alexander Duncan, VI, '14 (B.T.E.).**
Instructor, Northeastern University, Spring-
field, Mass.
- Davis, Arthur Sabin, IV, '40 (B.T.C.).**
Ensign, U. S. Navy Air Corps.
- Davis, Esther Alice, IV, '43 (B.T.C.).**
With Ridbo Laboratories, Inc., Paterson, N. J.
- Dearborn, Roy S., VI, '13 (D).**

- Del Plaine, Parker Haywood, IV, '25 (B.T.C.).**
Southern Manager, Rohm & Haas Company,
Inc., 1109 Independent Building, Charlotte,
N. C.
- DeMallie, Peter, IV, '43 (B.T.C.).**
Ensign, USNR.
- Dempsey, Phillip Edward, IV, '33 (B.T.C.).**
Capt., 938th Engineer Aviation Camouflage
Battalion, Santa Maria Air Field, Calif.
- Derby, Roland Everett, IV, '22 (B.T.C.).**
Proprietor, The Derby Company, Lawrence,
Mass.
- Derzawetz, Joseph, VI, '39 (B.T.E.).**
U. S. Naval Reserve, Navy Yard, Boston,
Mass.
- de Sa, Francisco, VI, '18 (B.T.E.).**
Avenue da Graca, Bahia, Brazil.
- Dewey, James French, II, '04 (D).**
Woolen Manufacturer, A. G. Dewey Company,
Quebec, Vt.
- Dewey, Maurice William, II, '11 (D).**
Investments, National Life Insurance Com-
pany, Montpelier, Vt.
- Dick, Henry Kendal, Jr., VI, '39 (B.T.E.).**
With Celanese Corporation of America, Nar-
rows, Va.
- Dillon, James Henry, III, '05 (D).**
- Dion, Ernest Lorenzo, IV, '35 (B.T.C.).**
Chemist, Zinsser & Company, Hastings-on-
Hudson, N. Y.
- Dods, James Barber, II, '27 (D).**
Vice-President, The Dods Knitting Company,
Ltd., Orangeville, Ont.
- Donald, Albert Edward, II, '04 (D).**
Manager, Franklin Yarn Co., Franklin, Mass.
- Donohoe, Edward Joseph, VI, '34 (B.T.E.).**
Manager, New York Laboratory, United States
Testing Company, Inc., 1450 Broadway, New
York City.
- Donovan, Joseph Richard, IV, '24 (B.T.C.).**
- Doran, Wilbur Kirkland, II, '22 (D).**
Real Estate and Insurance, W. K. Doran
Agency, Bristol, N. H.
- Dorr, Clinton Lamont, VI, '14 (D).**
General Manager, Raymond's, Inc., 356 Wash-
ington Street, Boston, Mass.
- Douglas, Walter Shelton, II, '21 (D).**
Estimator, Douglas & Co., Lowell, Mass.
- Dudley, Albert Richard, VI, '33 (B.T.E.).**
Chicopee Manufacturing Corporation, Chi-
copee Falls, Mass.
- Duggan, Paul Curran, IV, '31 (B.T.C.).**
Textile Chemist, Celanese Corporation of
America, New York, N. Y.
- Duguid, Harry Wyatt, I, '24 (D).**
Assistant Treasurer, Maverick Mills, East
Boston, Mass.
- Dunlap, Kirke Harold, Jr., VI, '30 (B.T.E.).**
Superintendent, Kenwood Mills, Ltd., Arn-
prior, Ont.
- Dunlap, Parker Frank, VI, '34 (B.T.E.).**
Textile Engineer, Chicopee Manufacturing
Corporation, Manchester, N. H.
- Dunnican, Edward Tunis, VI, '24 (B.T.E.).**
Instructor in Textile Shop Practice, Wilson
Junior High School, Passaic, N. J.
- Durgin, William Ernest, IV, '24 (B.T.C.).**
Textile Chemist, Geigy Company, Inc., 88
Broad Street, Boston, Mass.
- Dursin, Louis Jules, II, '36 (D).**
Superintendent and Personnel Manager,
Rochambeau Worsted Company, Providence,
R. I.
- Duval, Joseph Edward, II, '10 (D).**
Executive Vice-President, Massachusetts
Mohair Plush Company, 3701 North Broad
Street, Philadelphia, Pa.
- Dwight, John Francis, Jr., II, '08 (D).**
Hazel Avenue, Scituate, Mass.

E

- Echavarria, Luis, VI, '35 (B.T.E.).**
With Fabrica de Hilados y Tejidos del Hato,
Medellin, Colombia.
- Echecopar, Jesus Fortunato, VI, '33 (B.T.E.).**
Director-Gerente de Eguren, Echecopar y Cia.
S.A. and Profesor de Tecnologia Textil en la
Escuela de Ingenieros, Lima, Peru.

- Echmalian, John Gregory, VI, '16 (B.T.E.).**
Director, State Trade School, Manchester, Conn.
- Ehrenfried, Jacob Benjamin, II, '07 (C).**
Deputy Area Director War Manpower Commission, Federal Government, Lewiston, Me.
- Eichner, Albert David, VI, '42 (B.T.E.).**
Corporal, U. S. Army, Bomb Squadron.
- Eismann, Edmund, IV, '35 (B.T.C.).**
Staff Sgt., U. S. Army, Medical Detachment, Orlando Air Base, Orlando, Fla.
- Ekstrand, Frederic Lawrence, II, '39 (D).**
A/S, U. S. Army Air Corps, Northeast Air Lines (Instructor)
- Elliot, Gordon Baylies, II, '12 (D).**
Planning Department, Pacific Mills, Worsted Division, Lawrence, Mass.
- Ellis, Charles Albert, VI, '21 (B.T.E.).**
Engineer, Scott & Williams, Inc., Laconia, N. H.
- Ellis, Dorothy Myrta, VI, '25 (B.T.E.).**
Economist, War Production Board, Consumer Goods Bureau, Washington, D. C.
- Ellis, James Oliver, VI, '29 (B.T.E.).**
Overseer with Manville Jenckes Corporation, Manville, R. I.
- Engstrom, Karl Emil, VI, '12 (D).** (S.B. 1916, Massachusetts Institute of Technology.
18 St. Luke Road, Allston, Mass.
- Enloe, Winfred Paige, I, '22 (D).**
Agent, W. A. Handley Manufacturing Company, Roanoke, Ala.
- Epstein, Edward Joseph, IV, '41 (B.T.C.).**
Lieut. (j. g.), USNR.
- Esiellonis, Victor John, I, '39 (D).**
Shirley, Mass.
- Evans, Alfred Whitney, III, '03 (D).**
Apartment 312, Realty Building, Rochester, N. H.
- Evans, Paul Richard, II, '29 (D).**
District Manager, Economics Laboratory, Inc., Philadelphia, Pa.
- Evans, William Robinson, III, '03 (D).**
309 Main Street, Bradford, Mass.
- Everett, Charles Arthur, IV, '19 (B.T.C.).**
Instructor, Dyeing Department, Lowell Textile Institute, Lowell, Mass.
- F**
- Factor, Sidney Wilfred, IV, '41 (B.T.C.).**
49 Pleasant Street, Haverhill, Mass.
- Fairbanks, Almonte Harrison, II, '09 (D).**
Hollywood, Fla, P.O. Box 1838.
- Fairbanks, Evans Hobbs, VI, '35 (B.T.E.).**
Manufacturing Methods Engineer, General Electric Company, West Lynn, Mass.
- Falk, Stanley, VI, '40 (B.T.E.).**
U. S. Army.
- Farkas, Zoltan Roland, IV, '35 (B.T.C.).**
- Farley, Clifford Albert, VI, '28 (B.T.E.).**
Physical Testing Laboratory, F. C. Huyck & Sons, Rensselaer, N. Y.
- Farmer, Chester Jefferson, IV, '07 (D).** (Ph.D. Harvard University.)
Professor of Chemistry, Northwestern University Medical School, Chicago, Ill.
- Farnsworth, Harold Vincent, VI, '16 (B.T.E.).**
Trustee, Atkinson, Haserick & Co., 152 Congress Street, Boston, Mass.
- Farr, Leonard Schaefer, II, '08 (D).**
With A. D. Ellis Mills, Inc., Monson, Mass.
- Farwell, Claude Chapman, VI, '23 (B.T.E.).**
Radio Service, Farwell Radio & Television Laboratory, Groton, Mass.
- Fasig, Paul Leon, IV, '28 (B.T.C.).**
Chemist, American Chain & Cable Co., Reading, Pa.
- Fead, Robert William, II, '41 (D).**
Aviation Cadet, U. S. Army Air Corps.
- Feinberg, Benjamin, II, '27 (D).**
- Feindel, George Paul, IV, '24 (B.T.C.).**
Chief Chemist, Rock Hill Printing & Finishing Company, Rock Hill, S. C.
- Feldstein, Martin Alexander, VI, '24 (B.T.E.).**
With American Appliance Co., Albany, N. Y.
- Ferguson, Thomas Dickson, VI, '32 (B.T.E.).**
101 W. Gansevoort Street, Little Falls, N. Y.
- Ferguson, William Gladstone, III, '09 (D).**
Assistant Agent, Ludlow Manufacturing Associates, Ludlow, Mass.
- Ferris, Arthur Leon, II, '28 (D).**
Port Rowan, Ont.
- Feuerstein, James Mayer, VI, '40 (B.T.E.).**
P/fe, U. S. Army.
- Fieldsend, Arthur Tull, II, '43 (D).**
U. S. Army Air Corps.
- Finard, Saunders, IV, '41 (B.T.C.).**
Lieut. (j. g.) USNR.
- Finlay, Harry Francis, IV, '10 (D).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corporation, Boston, Mass.
- Fisher, Russell Todd, VI, '14 (D).** '25 (B.T.E.).
President & Secretary, National Association of Cotton Manufacturers, 80 Federal Street, Boston, Mass.
- Fisher, Thomas Nathan, VI, '42 (B.T.E.).**
Ensign, USNR.
- Fiske, Starr Hollinger, II, '09 (D).**
119 Livingston Avenue, Lowell, Mass.
- Fitzgerald, John Francis, IV, '18 (B.T.C.).**
Fitzgerald's Cleaners, Winchester, Mass.
- Fitzgerald, John Francis, IV, '28 (B.T.C.).**
National Starch Products, Inc., 820 Greenview Street, New York City.
- Fleischmann, Meyer, IV, '20 (B.T.C.).**
Chief Chemist, Real Silk Hosiery Mills, Inc., Indianapolis, Ind.
- Fleming, Frank Everett, IV, '06 (D).**
Superintendent, Dyeing and Finishing, Goodall Worsted Company, Sanford, Maine.
- Fletcher, Roland Hartwell, VI, '10 (D).**
Pressed Steel Car Company, Inc., McKees Rocks, Pa.
- Flood, Thomas Henry, IV, '27 (B.T.C.).**
Chemist and Salesman, National Aniline Division, Allied Chemical & Dye Corporation, Toronto, Ont.
- Flynn, Thomas Patrick, IV, '11 (D).**
129 Edgell Street, Gardner, Mass.
- Foisy, Robert William, VI, '43 (B.T.E.).**
Aviation Cadet, U. S. Army Air Corps.
- Ford, Edgar Robinson, IV, '11 (D).**
Technical Superintendent, Sayles Biltmore Bleacheries, Biltmore, N. C.
- Ford, Stephen Kenneth, IV, '28 (B.T.C.).**
Major, U. S. Army, Africa.
- Forsaith, Charles Henry, VI, '20 (B.T.E.).**
Superintendent, Nashua Manufacturing Company (Jackson Mills), Nashua, N. H.
- Forsaith, Ralph Allen, VI, '16 (B.T.E.).**
General Superintendent, Indianapolis Bleaching Co., Indianapolis, Ind.
- Forsyth, Harold Downes, VI, '23 (B.T.E.).**
Treasurer, William Forsyth & Sons Company, Lynn, Mass.
- Forsythe, George, VI, '34 (B.T.E.).**
- Foss, George Woodrow, II, '38 (D).**
Mechanical Goods Salesman, U. S. Rubber Co., Boston, Mass.
- Foster, Boutwell Hyde, VI, '17 (B.T.E.).**
Manager, Textile Section, General Labs., United States Rubber Company, Passaic, N. J.
- Foster, Clarence Everett, VI, '43 (B.T.E.).**
Massachusetts Institute of Technology, Cambridge, Mass.
- Foster, Clifford Eastman, II, '01 (D).**
251 Walnut Street, New Bedford, Mass.
- Fowle, Edwin Daniels, VI, '24 (B.T.E.).**
Publisher and Editor, Textile World, 330 West 42nd Street, New York 18, N. Y.
- Fox, David James, VI, '34 (B.T.E.).**
Assistant Superintendent, Horner Woolen Mills Company, Eaton Rapids, Mich.
- Fox, Kenneth Russell, VI, '38 (B.T.E.).**
Assistant Professor, Textile Technology, Massachusetts Institute of Technology, Cambridge, Mass.
- Fox, Louise, VI, '40 (B.T.E.).**
Textile Technician, Meyer Woolens, Inc., 1 West 47th Street, New York 19, N. Y.
- Fox, Theodore Webster, VI, '40 (B.T.E.).**
1st Lieut., Army Air Corps, Engineering Division, Wright Field, Dayton, Ohio.
- Franks, Jerome, VI, '27 (B.T.E.).** (M.S. 1929, Massachusetts Institute of Technology.)
With Marilyn Silk Mills, Phillipsburg, N. Y.

Fredrickson, Charles Joseph, Jr., IV, '29 (B.T.C.).
Chemist, White & Hodges, Everett, Mass.

Freedman, David, VI, '38 (B.T.E.).
Quartermaster Depot, Philadelphia, Pa.

French, Wallace Howe, IV, '31 (B.T.C.).
Overseer of Bleaching & Dyeing, Atlas Underwear Company, Richmond, Ind.

Frost, Harold Benjamin, II, '12 (D).
Resident Manager, Liberty Mutual Insurance Company, Brockton, Mass.

Fuller, Allen Reed, IV, '17 (B.T.C.).
Textile Chemist, A. E. Staley Manufacturing Company, Decatur, Ill.

Fuller, George, I, '03 (D).
Textile Consultant, Cox and Fuller, 320 Broadway, New York City.

Fuller, Samuel Lloyd, VI, '43 (B.T.E.).
Ensign, USNR.

Fyfe, Robert Clark, VI, '40 (B.T.E.).
Lieut., U. S. Army Air Force—Navigator, Heavy Bombardment Squadron, Army Air Base, Blythe, Calif.

G

Gagnon, Roland Joseph Octave, IV, '36 (B.T.C.).
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Gahm, George Leonhard, II, '06 (D).
Worsted Yarn Superintendent, Wood Worsted Mills, Lawrence, Mass.

Gainey, Francis William, IV, '11 (D).
Colorist, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.

Gale, Harry Laburton, III, '10 (D).
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Gallagher, Arthur Francis, IV, '30 (B.T.C.).
Chemist, Hayward Schuster Woolen Mills, Inc., East Douglas, Mass.

Gallagher, John Waters, II, '27 (D).
American Hair & Felt Co., Newark, N. J.

Garcia, Lorenzo Montero, VI, '38 (B.T.E.).
Technical Director, Cia. Textil "El Faisan" S. A., Mexico D. F., Mexico.

Gari, Jose Via, VI, '41 (B.T.E.).
Superintendent, Barron-Colmena S. A., Colmena, Edo. de Mexico, Mexico.

Garlick, Mrs. Dorothy M. (Burbeck, Dorothy M.), IV, '20 (B.T.C.).
192 Great Road, Maynard, Mass.

Garner, Allen Frank, II, '30 (D).
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Garnett, Richard Herbert, VI, '43 (B.T.E.).
Lieut., USNR.

Garnett, Stanley Arthur, II, '41 (D).
Captain, U. S. Army, Quartermaster Corps, Overseas.

Garnett, Mrs. Stanley A. (Keirstead, Edith L.), III, '42 (D).
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Gass, Matthew, IV, '41 (B.T.C.).
U. S. Navy.

Gatzimos, Stephen Aristophanes, IV, '41 (B.T.C.).

Gaudet, Walter Urban, II, '29 (D).
Insurance Broker and Advisor, Pawtucket, R. I.

Gay, Clarence Russel, II, '39 (D).
Textile Inspector, Quartermaster Depot, Boston, Mass.

Gay, Leon Stearns, Jr., II, '37 (D).
Vice President and Manager, Gay Bros. Co., Gaymont Division, Ludlow, Vt.

Gay, Olin Dow, II, '08 (D).
President, Gay Brothers Company, Cavendish, Vt.

Georgacoulis, George, IV, '36 (B.T.C.).
Chemist, E. I. du Pont de Nemours, Arlington, N. J.

Getchell, Nelson Fletcher, IV, '38 (B.T.C.).
Chemist, Ludlow-Manufacturing Company, Ludlow, Mass.

Glanaris, George Demetrios, VI, '39 (B.T.E.).
Textile Inspector, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.

Gifford, Alden Ives, Jr., VI, '34 (B.T.E.).
Assistant to Superintendent, Peppeler Mfg. Co., Blanket Division, Biddeford, Me.

Gill, John Schofield, IV, '40 (B.T.C.).
With Dize Awning and Tent Co., Winston-Salem, N. C.

Gillespie, Francis Clifford, IV, '34 (B.T.C.).
With Osgood Mills, North Andover, Mass.

Gillick, Thomas John, Jr., IV, '43 (B.T.C.).
Aviation Cadet, U. S. Army Air Corps.

Gillie, Stanley James, I, '22 (D).
Manager, Southern Testing House, United States Testing Company, Inc., Greensboro, N. C.

Gillon, Sara Agnes, IIb, '06 (C).

Gilman, Ernest Dana, II, '26 (D).
Men's Wear Designer & Stylist, Pacific Mills, Worsted Division, 261 Fifth Avenue, New York, 16, N. Y.

Gleklen, Leo, IV, '32 (B.T.C.).
Dyestuff Demonstrator and Salesman, United Aniline Company, Boston, Mass.

Glowacki, Joseph, VI, '32 (B.T.E.).
105 Salem Street, Andover, Mass.

Glowinski, Mitchell, IV, '34 (B.T.C.).
With Lawrence Manufacturing Company, Lowell, Mass.

Godfrey, Harold Thomas, VI, '26 (B.T.E.).
Sales Engineer-Director, Davis & Furber Machine Co., North Andover, Mass.

Goldberg, George, VI, '10 (D).
Manager, Liberty Lace and Braid Company, Boston, Mass.

Goldberg, Herbert Arthur, VI, '43 (B.T.E.).
Ensign, USNR.

Goldenberg, Louis G., VI, '27 (B.T.E.).

Goldman, Moses Hyman, IV, '20 (B.T.C.).
Civilian Allocation Specialist, Textile Division, W.P.B., Washington, D. C.

Golec, Edward Lucian, III, '32 (D).
Handkerchief Designer, Manhattan Shirt Company, New York City.

Goller, Harold Poehlmann, II, '23 (D).
Salesman, Clinton Company, Inc., Greenville, S. C.

Goodhue, Amy Helen, IIb, '00 (C).
See Harrison, Mrs. Arthur.

Gooding, Francis Earle, IV, '19 (B.T.C.).
Superintendent, Calco Chemical Company, Bound Brook, N. J.

Goodwin, John Alden, VI, '40 (B.T.E.).
U. S. Army Air Force.

Goostrey, Arthur, IV, '21 (B.T.C.).
With French Worsted Company, Woonsocket, R. I.

Goostrey, John Thomas, IV, '21 (B.T.C.).
Superintendent of Dyeing and Bleaching, New York Mills, New York Mills, N. Y.

Gottschalk, Lawrence William, VI, '28 (B.T.E.).
Sales Office, Scott & Williams, Inc., 350 Fifth Avenue, New York City.

Gould, Norman Culver, VI, '19 (B.T.E.).
Textile Designer, F. C. Huyck & Sons, Albany, N. Y.

Graham, Robert Theodore, IV, '34 (B.T.C.).
Inspection Department, Remington Arms Company, Utah Ordnance Plant, Salt Lake City, Utah.

Greenbaum, Herbert Baron, III, '29 (D).

Greenbaum, Hyman Herbert, IV, '35 (B.T.C.).
Proprietor, Exeter Food Center, Exeter, N. H.

Greenberg, Archie, II, '21 (D).

Greendonner, George John, Jr., IV, '30 (B.T.C.).
Textile Chemist, Buffalo Electro-Chemical Co. Inc., Buffalo 7, N. Y.

Greene, John Lester, VI, '39 (B.T.E.).
U. S. Army, Engineer Replacement Training.

Greenwood, John Roger, II, '27 (D).
Superintendent, W. W. Windle Company, Millbury, Mass.

Gregory, Robert Crockett, VI, '34 (B.T.E.).
Lieut. (j.g.) USNR.

Griffin, Roger Castle, Jr., IV, '43 (B.T.C.).
Graduate Student, Lowell Textile Institute.

Griffin, Vernon Harcourt, IV, '35 (B.T.C.).
Overseer of Dyeing and Finishing, Samson Cordage Works, Shirley, Mass.

- Grondin, Abraham Hector, IV, '41 (B.T.C.).**
Captain, U. S. Army, Chemical Warfare Service.
- Gross, Herman Peter, IV, '30 (B.T.C.).**
Lieut. U. S. Air Corps.
- Grossman, Clinton, IV, '38 (B.T.C.).**
Corporal, U. S. Army.
- Grossman, Edward, VI, '42 (B.T.E.).**
- Guild, Lawrence Winfield, VI, '27 (B.T.E.).**
President, L. W. Guild Company, Inc., 140 Harrison Avenue, Boston, Mass.
- Gulfoyle, Donald William, VI, '41 (B.T.E.).**
2d Lieut., U. S. Army Air Corps.
- Gwinnell, George Harry, II, '25 (D).**
Superintendent, Berkshire Woolen Company, Pittsfield, Mass.
- Gyzander, Arne Kolthoff, IV, '09 (D).**
Chemist, National Aniline Division, Allied Chemical & Dye Corp., 40 Rector Street, New York City.
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- Haddad, Nassib, VI, '23 (B.T.E.).**
Textile Engineer, General Laboratory, United States Rubber Company, Passaic, N. J.
- Hadley, Richard Francis, IV, '22 (B.T.C.).**
Sales Engineer, Parks & Woolson Machine Company, Springfield, Vt.
- Hadley, Walter Eastman, IV, '08 (D).**
Chief Chemist, Standard Coosa Thatcher Company, Chattanooga, Tenn.
- Hadley, Wilfred Nourse, II, '22 (D).**
Manager, Parks & Woolson Machine Company, Springfield, Vt.
- Hager, Hazen Otis, II, '21 (C).**
Manager and Owner, Suburban Gas Company, Portland, Me.
- Haggerty, William Thomas, IV, '43 (B.T.C.).**
Chemist, Dye Research, Celanese Corporation of America, Cumberland, Md.
- Hakanson, Gustave Warren, IV, '37 (B.T.C.).**
Asst. Supt., Standards Control Dept., Acetate Yarn Division, Tennessee Eastman Corporation, Kingsport, Tenn.
- Hale, Alfred Sandel, IV, '09 (D).**
360 West Main Street, Rockaway, N. J.
- Hale, Ralph Edgar, IV, '31 (B.T.C.).**
Chemist, The Bell Company, Worcester, Mass.
- Hall, Frederick Kilby, VI, '24 (B.T.E.). (A.M. 1930, The George Washington University.)**
Major, Quartermaster Corps, Overseas.
- Hall, Richard Thomas, IV, '40 (B.T.C.).**
U. S. Army.
- Hall, Stanley Arundel, IV, '31 (B.T.C.).**
Assistant Gas Engineer, Malden & Melrose Gas Light Co., Malden, Mass.
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Ensign, U. S. Naval Reserve.
- Hammond, Chester Twombly, II, '23 (D).**
Manager, Niagara Rug & Carpet Company, Inc., Buffalo, N. Y.
- Hanscom, Edwin Thomas, II, '27 (D).**
Personal Manager, John T. Slack Corp., Springfield, Vt.
- Hardie, Newton Gary, I, '23 (D).**
General Superintendent, Gossett Mills, Anderson, S. C.
- Hardman, Joseph Edwin, IV, '32 (B.T.C.).**
Textile Products Company, Lowell, Mass.
- Hardy, Philip Lewis, VI, '10 (D).**
Contractor, Andover, Mass.
- Hardy, Thomas Wadsworth, IV, '38 (B.T.C.).**
Ensign, USNR
- Harmon, Charles Francis, I, '99 (D).**
- Harper, Cyril Newcomb, IV, '42 (B.T.C.).**
2d Lieut., U. S. Air Corps
- Harpott, Burgess Charles, VI, '38 (B.T.E.).**
U. S. Army.
- Harrington, Thomas, IV, '15 (D).**
President, Hart & Harrington, 925 Weed Street, Chicago, Ill.
- Harris, Carl Webster, II, '42 (D).**
With Harris, Emery Co., Inc., Penacook, N. H.
- Harris, Charles Edward, I, '05 (D).**
With Norwood Engineering Company, Florence, Mass.
- Harris, George Simmons, I, '02 (C).**
President and Treasurer, Riverside & Dan River Cotton Mills, Danville, Va.
- Harrison, Mrs. Arthur (Goodhue, Amy Helen), IIIb, '00 (C).**
- Hart, Arthur Norman, IV, '19 (B.T.C.).**
- Hart, Howard Roscoe, I, '23 (D).**
Vice-President, Brighton Mills, Inc., Shannon, Ga.
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- Hassett, Paul Joseph, IV, '12 (D).**
Cortland Works Manager, L. C. Smith & Corona Typewriters, Inc., Cortland, N. Y.
- Hathaway, William Tabor, II, '26 (D).**
General Cashier, Commonwealth of Massachusetts, State House, Boston, Mass.
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Chemist, Lawrence Gas & Electric Company, Lawrence, Mass.
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Consultant, New England Research Associates, New York, N. Y.
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Agent, Monomac Spinning Company, Lawrence, Mass.
- Haynes, Amos Kempton, IV, '29 (B.T.C.).**
Technician, Rohm & Haas Co., Inc., Atlanta, Ga.
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U. S. Coast Guard.
- Hegy, Gerard John Joseph, VI, '32 (B.T.E.).**
Dyer, Hegy's, Inc., Holyoke, Mass.
- Hendrickson, Walter Alexander, II, '11 (D).**
Plant Manager, Max Lowenthal & Sons, Rochester, N. Y.
- Hennigan, Arthur Joseph, II, '06 (D).**
- Hetherman, Patrick Joseph, IV, '29 (B.T.C.).**
- Hibbard, Frederick William, IV, '25 (B.T.C.).**
Lieutenant (i.g.) U. S. Naval Reserve.
- Higginbottom, George Stephen, IV, '41 (B.T.C.).**
Junior Chemist, Naval Clothing Depot, Brooklyn, N. Y.
- Hildreth, Harold William, II, '07 (D).**
Westford, Mass.
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Production Manager, Samson Cordage Works, Boston, Mass.
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- Hintze, Thomas Forsyth, I, '06 (C).**
Farmer, Cairo, Georgia.
- Hobson, Edward Shackford, III, '40 (D).**
U. S. Army.
- Hochschild, Reinhard George, IV, '43 (B.T.C.).**
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- Hockmeyer, Clive Edward, Jr., I, '40 (D).**
Industrial Engineer, E. I. DuPont de Nemours & Co., Inc., Hanford, Wash.
- Hockridge, Stanley Squire, IV, '32 (B.T.C.).**
Chemist, Stein Hall & Co., Charlotte, N. C.
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Assistant Superintendent, Berkshire Division "A," Berkshire Fine Spinning Associates, Inc., North Adams, Mass.
- Hoffman, Richard Robert, II, '21 (C).**
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U. S. Army.
- Holden, Francis Crawford, IV, '09 (D).**
Chemist, Ludlow Manufacturing & Sales Company, Ludlow, Mass.
- Holden, John Sanford, II, '20 (D).**
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Hood, Leslie Newton, IV, '12 (D).

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Hurwitz, Jacob, IV, '23 (B.T.C.).

Hutton, Clarence, III, '03 (C).
Advertising-Publicity, Davis & Furber Ma-
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Huyck, William Francis, II, '34 (D).
Ski Troops, U. S. Army.

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I

Inkpen, Norman Alfred, IV, '41 (B.T.C.).
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J

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Jones, Bliss Morris, IV, '30 (B.T.C.).
Sales Manager, Rodney Hunt Machine Com-
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Jones, Charles Andrews, Jr., VI, '41 (M.S.).
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Major, U. S. Army, Overseas.

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Joslin, Harold Wheeler, II, '28 (D).
Merchant, Cut Rate Store, Windsor, Vt.

Joy, Thomas, VI, '26 (B.T.E.).
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Mass.

Jury, Alfred Elmer, IV, '04 (D).
Agent, Winnsboro Mills, Winnsboro, S. C.

K

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Kaiser, J. Raymond, VI, '36 (B.T.E.).
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Kane, Roger Hugh, II, '38 (D).
Lieut., U. S. Army.

Kao, Chieh-Ching, VI, '23 (B.T.E.).
China Cotton Trade Corp., Chungking, China.

Kaplan, Samuel Gilbert, IV, '38 (B.T.C.).
Junior Inspector of Textiles, U. S. A. Quarter-
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Kay, Harry Pearson, II, '09 (D).
 Associate Member, Penn Mutual Life Insurance Company, Boston, Mass.
Keirstead, Edith Louise, III, '42 (D). See Mrs. Stanley A. Garnett.
Kelakos, Charles George, VI, '38 (B.T.E.).
 Lieutenant, Air Corps, Communications Office, U. S. Army.
Kelly, Allan William, VI, '43 (B.T.E.).
 4340 Livingston Road, S.E., Washington, D. C.
Kelly, Warren Thomas, VI, '38 (B.T.E.).
 Draftsman, Bureau of Aeronautics, Washington, D. C.
Kendall, Charles Henry, II, '23 (D).
 Superintendent and Designer, Bridgewater Woolen Company, Bridgewater, Vt.
Kennedy, Francis Charles, VI, '26 (B.T.E.).
 Engineer, United States Rubber Company, Detroit, Mich.
Kennedy, James Harrington, Jr., VI, '36 (B.T.E.), '40 (M.S.).
 Captain, Quartermaster Depot, Philadelphia, Pa.
Kennedy, Matthew Anthony, VI, '43 (B.T.E.).
 Ensign, USNR.
Kennedy, Robert Miller, VI, '38 (B.T.E.).
 2nd Lieut., U. S. Marine Corps (Res.) Depot of Supplies, 1100 So. Broad St., Philadelphia, Pa.
Kenney, Frederick Leo, II, '27 (D).
 Mill Superintendent, Uxbridge Worsted Company, Pascoag, R. I.
Kent, Clarence LeBaron, III, '06 (C).
 Dealer, Socony Vacuum Oil Company, South Portland, Me.
Keough, Wesley Lincoln, II, '10 (D).
 Clerk of Police Court, Pasadena, Calif.
Kidder, Glen Mortimer, IV, '34 (B.T.C.).
 Drill Corporal, U. S. Army.
Kiernan, James Vincent, VI, '40 (B.T.E.).
 1st Lieut., U. S. Army.
Killheffer, John Vincent, IV, '28 (B.T.C.).
 Laboratory Manager, E. I. du Pont de Nemours & Co., Inc., Dyestuffs Division, Charlotte, N. C.
Kilmartin, John Joseph, I, '31 (D).
 Department of Public Health, Lowell, Mass.
King, Daniel Joseph, IV, '32 (B.T.C.).
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 Ensign, USNR.
Klosowicz, Edward Joseph, VI, '38 (B.T.E.).
 Private, 1st Class, U. S. Army.
Knight, Richard Greene Howland, Jr., VI, '38 (B.T.E.).
 U. S. Army.
Knowland, Daniel Power, IV, '07 (D).
 Chemist, Geigy Company, Inc., 89 Barelay Street, New York City.
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 Assistant Sanitary Engineer, Massachusetts Department of Public Health, Boston, Mass.
Kokoska, Michael George, VI, '33 (B.T.E.).
Kolsky, Samuel Irving, IV, '30 (B.T.C.).
 Manager, Kolsky Jewelry Co., Lawrence, Mass.
Kopatch, Chester Marion, IV, '35 (B.T.C.).
 U. S. Army.
Koroskys, Michael Joseph, II, '41 (D).
 Corporal, U. S. Army Air Corps.
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 Farmer, Chelmsford, Mass.
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 Aviation Cadet, U. S. Army Air Corps.
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 Montgomery, India.
Kuo, Limao, VI, '26 (B.T.E.).
 In charge of Quality Testing Division, Shanghai Bureau of Inspection and Testing of Commercial Commodities, Shanghai, China.
- Lamb, Arthur Franklin, II, '10 (D).**
 In business, Cleansing and Dyeing, Lamb's Cleaning, Rockland, Maine.
Lamont, Robert Laurence, II, '12 (D).
 Vice President, L. F. Grammes & Sons, Inc., Allentown, Pa.
Lamprey, Leslie Balch, IV, '16 (B.T.D.).
 Lawrence Post Office, Lawrence, Mass.
Lamson, George Francis, I, '00 (D).
 With Johnson & Bassett, Inc., Worcester, Mass.
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 Research Chemist, American Cyanamid Company, Plastic Division, Wallingford, Conn.
Lane, John William, I, '06 (C).
Lane, Joseph James, 2nd, VI, '41 (B.T.E.).
 Sgt., U. S. Army, Overseas.
Lane, Mrs. Joseph J., 2nd (Woodard, Alice M.) VI, '41 (B.T.E.).
 Textile Testing, Gatke Asbestos Textile Corp. North Brookfield, Mass.
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Laughlin, James Knowlton, III, '09 (D).
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Leonard, Leo Edward, I, '27 (D).
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 Lieut., U. S. Army.
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 See Carter, Mrs. Dorothy E.
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Lewis, LeRoy Clark, IV, '08 (D).
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Liang, Leland Sung, VI, '42 (B.T.E.).
Lifland, Abraham, IV, '31 (B.T.C.).
Lifland, Bessie, IV, '32 (B.T.C.).
 See Appel, Mrs. Bessie L.
Lifland, Morris, VI, '33 (B.T.E.).
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Linsey, Edward, II, '25 (D).

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See Whiting, Mrs. Frank E.

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Lieutenant-Colonel, U. S. Army, Overseas.

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Lieutenant-Commander, U. S. Navy.

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143 Park Drive, Ste. 3-7, Boston, Mass.

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Vice-President, Frank G. W. McKittrick Co., Lowell, Mass.

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Production Manager, Tungsten Company, Newark, N. J.

MacPherson, Wallace Angus, III, '04 (D).
Designer, Wuskanut Mills, Inc., Farnumville, Mass.

McQuade, Allan John, VI, '36 (B.T.E.).
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McQuaid, Barton Mathewman, IV, '32 (B.T.C.).
Billerica, Mass.

McTeague, George David, IV, '41 (B.T.C.).
Chemist, Smith Paper Co., Lee, Mass.

Macher, Henry, II, '23 (D).

Mackie, Chauncey Jacob, II, '40 (D).
1st Lieut., U. S. Army Air Corps.

Macketz, Lester Allen, II, '41 (D).
2nd Lieut., 24th Combat Mapping Squadron, U. S. Army.

Maguire, James Joseph, II, '28 (D).
Designer, Uxbridge Worsted Company, Uxbridge, Mass.

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872 Central Street, Lowell, Mass.

Mahoney, Francis Vincent, Jr., IV, '41 (B.T.C.).
U. S. Army Signal Corps.

Mahoney, George Stephen, VI, '22 (B.T.E.).
Superintendent, Franklin Cotton Mill Company, Cincinnati, Ohio.

Mahoney, Joseph Healey, IV, '38 (B.T.C.).
Inspector, Quartermaster Depot, Jeffersonville, Ind.

Mailey, Howard Twisden, II, '08 (D).
Manufacturing Superintendent, Worsted Division, Pacific Mills, Lawrence, Mass.

Mallon, John Francis, IV, '43 (B.T.C.).
Lieut., U. S. Army Air Corps.

Manderbach, Harold Mills, VI, '37 (M.S.).
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Lieutenant Colonel, Director of Supply, U. S. Army Quartermaster's Depot, Philadelphia, Pa.

Mandikos, George John, IV, '42 (B.T.C.).
Student, Lowell Textile Institute, Lowell, Mass.

Manning, Frederick David, IV, '10 (D).
Industrial Engineer, General Cable Corporation, Perth Amboy, N. J.

Manning, Neil Joseph, IV, '41 (B.T.C.).
Teacher, High School, Jeffersonville, Ind.

Marinel, Walter Newton, I, '01 (D).
Engineer and Auto Mechanic, Morris Brothers, North Chelmsford, Mass.

Mark, Aris Sawa, VI, '22 (B.T.E.).
Sales Department, Franklin Manufacturing Company, Inc., 40 Worth Street, New York City.

- Markarian, Haig, IV, '33 (B.T.C.).
U. S. Army.
- Markarian, Moushy, IV, '36 (B.T.C.).
Chemist, Sprague Specialties Company, North Adams, Mass.
- Marsden, Sidney Robert, IV, '39 (B.T.C.).
- Marshall, Chester Stanley, II, '22 (D).
Representative, The Spool Cotton Co., Pawtucket, R. I.
- Martin, Harry Warren, IV, '11 (D).
Manager of Footwear, Hood Rubber Company, Inc., Watertown, Mass.
- Maslanka, Edward John Felix, IV, '40 (B.T.C.).
Lieut., USNR.
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Concord Road, Billerica, Mass.
- Mason, Frederick Rufus, VI, '41 (B.T.E.).
Assistant Superintendent, Macon Textiles, Inc., Macon, Ga.
- Mason, Philip Edwin, IV, '26 (B.T.C.).
Purchasing Agent and Chief Chemist, Watson Park Company, Ballardvale, Mass.
- Mather, Harold Thomas, VI, '13 (D).
Inspector, Associated Factory Mutual Fire Insurance Companies, Boston, Mass.
- Mathieu, Alfred Jules, II, '20 (D).
Textile Executive — Contact Man, French Worsted Company, Woonsocket, R. I.
- Matthews, Elmer Clark, II, '17 (D).
Treasurer and General Manager, Thermo Mills, Inc., Hudson, N. Y.
- Matthews, Raymond Lewis, IV, '34 (B.T.C.).
Lieutenant (j.g.), U. S. Naval Reserve.
- Matthews, Robert Jackson, VI, '29 (B.T.E.).
Sergeant, U. S. Army.
- Mauersberger, Herbert Richard Carl, III, '18 (D).
Technical Editor, Rayon Publishing Corporation, 303 Fifth Avenue, New York City.
- Mazer, Samuel, IV, '26 (B.T.C.).
In business, Dyer and Converter of Yarns, S. Mazer & Co., Allston, Mass.
- Meadows, William Ransom, I, '04 (D).
Chief, Raw Cotton Unit, War Production Board, Washington, D. C.
- Meehan, John Joseph, IV, '32 (B.T.C.).
- Meek, Lotta, IIIB, '07 (C).
* See Parker, Mrs. Herbert L.
- Meeker, Samuel, IV, '27 (B.T.C.).
Chemist, Aridye Corporation, Fairlawn, N. J.
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Medellin, Colombia, S. A.
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Pilot, U. S. Air Force.
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Aviation Cadet, U. S. Army Air Corps.
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First Lieutenant, U. S. Army, Chemical Warfare Service, Overseas.
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Salesman, E. I. du Pont de Nemours & Co., 140 Federal Street, Boston, Mass.
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Plant Supervisor, Monterey Undergarment Co., Inc., East Newark, N. J.
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Material Engineer, Naval Aircraft Factory, Navy Yard, Philadelphia, Pa.
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Mintz, Irving Paul, IV, '41 (B.T.C.).
U. S. Army.
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Senior Inspector of Textiles, Philadelphia Quartermaster Depot, Philadelphia, Pa.
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- Moller, Ernest Arthur, II, '22 (D).
Manager, Cycle Tire Department, The Good-year Tire & Rubber Co., Inc., Akron, Ohio.
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Salesman, F. C. Huyck & Sons, Albany, N. Y.
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U. S. Army.
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Technical Service-Synthetic Resins, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.
- Moore, Edward Francis, II, '25 (D).
Superintendent, The Adler Company, Cincinnati, Ohio.
- Moore, Everett Byron, I, '05 (D).
Superintendent, Bridgeport Fabrics, Bridgeport, Conn.
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Custom Examiner's Aid, U. S. Customs Service, Treasury Department, Philadelphia, Pa.
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Private, 1st Class, U. S. Army.
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Ensign, USNR.
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With Eagle Oil & Supply Co., South Boston, Mass.
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Superintendent, Lawrence Print Works, Inc., Lawrence, Mass.
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Industrial Manager, Commonwealth of Massachusetts, West Concord, Mass.
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Chief Cost Accountant, Wellington Sears Company, New York, N. Y.
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Textile Research Chemist, National Starch Products, Inc., 820 Greenwich Street, New York, N. Y.
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Lieut., U. S. Army.
- Murphy, John Anthony, IV, '42 (B.T.C.).
Lieut. (j.g.), USNR.
- Murphy, John Joseph, IV, '33 (B.T.C.).
Sergeant, U. S. Army.
- Murray, James, IV, '13 (D).
Chemist and Superintendent, Martin Cantine Company, Saugerties, N. Y.
- Murray, James Andrew, II, '10 (D).
Field Investigator, Division of Employment Security, Boston, Mass.
- Myers, Walter Flemings, VI, '29 (B.T.E.).
Branch Salesman, Atlantic Register Company of Waltham, Mass., Philadelphia, Pa.

- Nerney, Francis Xavier, IV, '37 (B.T.C.).**
Textile Chemist, Buffalo Electro Chemical Co., Buffalo, N. Y.
- Neugroschl, Sigmond Israel, I, '21 (D).**
Newall, J. Douglas, IV, '09 (D).
22 South Main Street, Derry Village, N. H.
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Manager, Philadelphia Dye Sales, E. I. du Pont de Nemours & Co., 1616 Walnut Street, Philadelphia, Pa.
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Furniture Dealer, Neyman Furniture Company, Lowell, Mass.
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522 Pine St., Lowell, Mass.
- Niven, Robert Scott, VI, '12 (D).**
Draftsman, General Electric Company, Lynn, Mass.
- Noonan, Paul Francis, IV, '42 (B.T.C.).**
Lieut., U. S. Army Air Corps.
- Nostrand, Mrs. William L. (Conklin, Jennie Grace), IIIB, '05 (C).**
- Nuttall, Andrew Frederick, IV, '40 (B.T.C.).**
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O

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Dyer, National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- O'Connor, Lawrence Dennis, VI, '17 (D).**
With Beggs & Cobb, Winchester, Mass.
- O'Donnell, John Delancy, I, '04 (C).**
- O'Donoghue, Eileen Margaret, VI, '39 (B.T.E.).**
See Chapman, Mrs. Boyd P., Jr.
- O'Hara, William Francis, IV, '04 (C).**
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Research Laboratory, J. P. Stevens & Co., 44 Leonard Street, New York, N. Y.
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Pacific Mills, Lawrence, Mass.
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Textile Engineer, Chicopee Manufacturing Corporation of New Hampshire, Manchester, N. H.
- Olsen, Herbert Charles, IV, '39 (B.T.C.).**
T/Sgt., U. S. Army.
- Olson, Carl Oscar, II, '24 (D).**
Proprietor, Olson Beauty Salon, Hartford, Conn.
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Aviation Cadet, U. S. Army.
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Dyer, Bradford Dyeing Association, Bradford, R. I.
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Manager, Storey & Co., Brockton, Mass.
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President, Greenville Mills, Inc., Boston, Mass.
- Othote, Louis Joseph, I, '23 (D).**
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P

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Paul Whitin Manufacturing Company, Northbridge, Mass.
- Palais, Samuel, IV, '18 (B.T.C.).**
With Worcester Knitting Company, Worcester, Mass.
- Pappas, Vasil James, IV, '42 (B.T.C.).**
Lieut., U. S. Army Air Corps.
- Parechanian, James Humphrey, IV, '35 (B.T.C.), '38 (M.S.).**
Lieut., U. S. Chemical Warfare Service.
- Parigian, Harold Hrant, IV, '28 (B.T.C.).**

- Parker, Everett Nichols, I, '05 (D).**
President, Parker Spool and Bobbin Company, 27-53 Middle Street, Lewiston, Maine
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Mill Engineer, Castanea Paper Company, Lock Haven, Pa.
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Production Manager, Limerick Yarn Mills, Limerick, Me.
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President and General Manager, Connecticut Cordage Company, North Oxford, Mass.
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Superintendent, Hathaway Manufacturing Company, New Bedford, Mass.
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Lieutenant, U. S. Army Air Corps
- Peabody, Roger Merrill, II, '16 (D).**
Application and Development Engineer, Scovill Manufacturing Company, Waterbury, Conn.
- Pearlstein, Maxwell, III, '28 (D).**
- Pearsall, Samuel, II, '42 (D).**
2nd Lieut., U. S. Army Air Corps—Bombardier
- Pearson, Alfred Henry, IV, '11 (D).**
Demonstrator and Salesman, Ciba Company, Inc., 157 Federal Street, Boston, Mass.
- Peary, John Ervin, III, '31 (D).**
- Pease, Chester Chapin, I, '09 (D).**
With Jackson Mills, Nashua, N. H.
- Pease, Kilburn Gray, I, '38 (D).**
U. S. Army.
- Peck, Carroll Wilmot, IV, '13 (D).**
President and Treasurer, George Mann & Co., Inc., Providence, R. I.
- Pelt, Joseph Paul, Jr., VI, '40 (B.T.E.).**
Assistant Manager and Secretary, Groblue Sportswear, Newark, N. J.
- Penney, Cabot William, III, '33 (D).**
Superintendent, Wyandotte Worsted Company, Pittsfield, Mass.
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24 Abbott Street, Pittsfield, Mass.
- Perkins, J. Dean, III, '08 (D).**
Superintendent, Arms Textile Manufacturing Company, Manchester, N. H.
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Treasurer, Mallon Mattress Corp., Boston, Mass.
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Superintendent of Dyeing and Finishing, Kramer Hosiery Company, Nazareth, Pa.
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Staff Sergeant, U. S. Marine Corps, Depot of Supplies, Philadelphia, Pa.

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Advertising Manager, Universal Winding Company, Providence, R. I.
- Pinatel, John Andre, VI, '43 (B.T.E.).**
Ensign, USNR.
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Teacher, Central High School of Needle Trades, New York, N. Y.
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General Manager, Pacific Mills, Worsted Division, Lawrence, Mass.
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Chief Control Chemist of Fuel Cells, U. S. Rubber Co., Naugatuck, Conn.
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Colorist, Pacific Mills, Worsted Division, Lawrence, Mass.
- Plovnick, Max David, IV, '35 (B.T.C.).**
Textile Chemist, Thermoid Company, Southern Division, Charlotte, N. C.
- Poremba, Leo Louis, IV, '35 (B.T.C.).**
U. S. Army.
- Portilla, Jose Luis, VI, '41 (B.T.E.).**
Manager, Hilos Continental, S. A., Col. Agricola Oriental, Mexico.
- Potter, Carl Howard, I, '09 (D).**
Sales Agent and Broker, 366 Broadway, New York City.
- Pottinger, James Gilbert, II, '12 (D).**
President, Treasurer and General Manager, Everlastik, Inc., 181 Spencer Avenue, Chelsea, Mass.
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78 Broad Street, Danielson, Conn.
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78 Broad Street, Danielson, Conn.
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Chemist, Arlington Mills, Lawrence, Mass.
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Vice-President, January & Wood Co., Maysville, Ky.
- Prescott, Walker Flanders, IV, '09 (D).**
Owner, Prescott & Co., Reg'd, Montreal, Can.
- Prescott, William Benjamin, IV, '39 (B.T.C.).**
2d Lieut., U. S. Medical Corps.
- Preston, Harold Lawrence, VI, '30 (B.T.E.).**
U. S. Navy.
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Commander, U. S. Navy, Naval Clothing Depot, Brooklyn, N. Y.
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U. S. Army Signal Corps.
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With Asbestos Textile Co., North Brookfield, Mass.
- Putnam, Leverett Nelson, IV, '10 (D).**
Overseer of Dyeing, Pacific Mills, Worsted Division, Lawrence, Mass.
- Putnam, Philip Clayton, IV, '13 (D).**
Foreman Dyer, Apponaug Company, Apponaug, R. I.

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U. S. Army.
- Quigley, Gerald Francis, IV, '31 (B.T.C.).**
Boss Dyer, Hampton Co., Easthampton, Mass.
- Quinlan, William Harold, VI, '20 (B.T.E.).**

R

- Radford, Garland, II, '20 (D).**
President, Oriental Textile Mills, Houston, Texas.
- Ramsdell, Theodore Ellis, I, '02 (D).**
President, Monument Mills, Housatonic, Mass.
- Rand, Woodbury Holmes, II, '42 (D).**
Aviation Cadet, U. S. Army Air Force.
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Time Study and Methods, Maidenform Brassiere Co., Bayonne, N. J.

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Ensign, U. S. Naval Reserve.
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Supervisor, Shell Production, Whittin Machine Works, Whitinsville, Mass.
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Silviculturist, Essex, Mass.
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Owner, The Reelin Corporation, Milford, Mass.
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Designer, Waucantuck Mills, Uxbridge, Mass.
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Assistant Editor, *Textile World*, New York, N. Y.
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President and Treasurer, Surgical Products, Inc., Lowell, Mass.
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Ensign, USNR.
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Director of Priorities and Allocations and Production Control Manager, The Russell Mfg. Co., Middletown, Conn.
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- Reynolds, Isabel Halliday, III, '03 (C).**
Clerk, Pacific Mills Print Works, Lawrence, Mass.
- Reynolds, Raymond, II, '24 (D).**
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With Sidney Blumenthal & Co., Shelton, Conn.
- Rich, Charlotte Merline, IV, '41 (B.T.C.).** See Michelson, Mrs. Charlotte R.
- Rich, Edward, IV, '15 (B.T.D.).**
- Rich, Everett Blaine, III, '11 (D).**
Wolfeboro, N. H.
- Rich, Milton Scott, II, '22 (D).**
- Richardson, George Oliver, IV, '16 (B.T.D.).**
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- Ripley, George Keyes, II, '17 (D).**
President, Troy Blanket Mills, Troy, N. H.
- Ritchie, Newell Baird, IV, '40 (B.T.C.).**
Tech. Sgt., U. S. Army, Overseas.
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Manager, Metropolitan Life Insurance Company, Marlboro, Mass.
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See Weinbeck, Mrs. John C.
- Robbins, Walter Archibald, VI, '30 (B.T.E.).**
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Union State Bank, Pell City, Ala.
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Robinson, Ernest Warren, IV, '08 (D).
Manager, Line Division, The Shakespeare Company, Kalamazoo, Mich.

Robinson, John Bailey, II, '42 (D).
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Robinson, Russell, VI, '21 (B.T.E.).
With Providence Braid Company, Pawtucket, R. I.

Robinson, William Albert, II, '25 (D).
Shipbuilding, Ipswich, Mass.

Robinson, William Carleton, III, '03 (C).

Robson, Frederick William Charles, IV, '10 (D).

Rodalvicz, Francis Rudolph, IV, '28 (B.T.C.).
Chief Textile Research Chemist, Masury-Young Co., Boston, Mass.

Rogoff, David, VI, '42 (B.T.E.).
2nd Lieut., U. S. Army Air Corps.

Roth, Paul, VI, '40 (B.T.E.). (Ed.M., 1941).
Assistant Superintendent, National Felt Company, Easthampton, Mass.

Roumas, Zenon Anthony, IV, '42 (B.T.C.).
U. S. Army.

Rowen, Edward Joseph, Jr., VI, '43 (B.T.E.).
Ensign, USNR.

Rowntree, Clyde Burton, IV, '39 (B.T.C.).
Textile Bacteriologist and Chemist, Pacific Mills, Worsted Division, Lawrence, Mass.

Royal, Louis Merry, VI, '21 (B.T.E.). (Ed.M., 1941, R. I. College of Education).
Teacher of Mathematics, East Senior High School, Pawtucket, R. I. and Naval Inspector of Ordnance, British Admiralty Tech. Mission, Providence, R. I.

Runnells, Harold Nelson, IV, '25 (B.T.C.).
Draftsman, Samuel Eastman Co., Inc., Concord, N. H.

Russell, Harold William, VI, '32 (B.T.E.).
In Charge of Textile Research Laboratory, Goodall Worsted Company, Sanford, Me.

Russell, John William, IV, '20 (B.T.C.).
Assistant Treasurer, American Lanolin Corporation, Lawrence, Mass.

Russell, William Samuel, Jr., VI, '28 (B.T.E.).
Textile Division Manager, Keasbey & Mattison Co., Ambler, Pa.

Ryan, David Louis, II, '27 (D).
Sales Agent, Duplan Corporation, 18 West Chelton Avenue, Philadelphia, Pa.

Ryan, Lawrence Francis, IV, '23 (B.T.C.).
Chemist and Demonstrator, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Ryan, Millard Kenneth Thomas, Jr., II, '24 (D).
With E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Ryberg, Bertil August, IV, '29 (B.T.C.), '36 (M.S.).
Associate Director of Research, American Association of Textile Chemists and Colorists, Lowell Textile Institute, Lowell, Mass.

S

Sadler, Thomas Sheridan, II, '30 (D).
With Carolina Asbestos Company, Davidson, N. C.

Saltsman, Sidney Irving, IV, '41 (B.T.C.).
Ensign, U. S. Naval Reserve.

Sampson, Clifford William, IV, '28 (B.T.C.).
Sales Manager, Chemical Division, Emery Industries, Inc., Cincinnati, Ohio.

Sanborn, Frank Morrison, VI, '19 (B.T.E.).
With Winnsboro Cotton Mills, Winnsboro, S. C.

Sanborn, Ralph Lyford, VI, '16 (B.T.E.).
Purchasing Agent, Firestone Cotton Mills, Inc., Gastonia, N. C.

Sandlund, Carl Seth, VI, '25 (B.T.E.).
In Charge of Testing, Dyeing & Throwing, Proper-McCallum Hosiery Company, Northampton, Mass.

Sanford, George Morse, Jr., VI, '43 (B.T.E.).
1st Lieut., U. S. Army Air Corps.

Sargent, Robert Edward, IV, '25 (B.T.C.).
Chemist, Tubize Rayon Corporation, Rome, Ga.

Sargent, Walter Ambrose, I, '22 (D).
Instructor, Textile Shop Practice, Board of Education, Passaic, N. J.

Saunders, Harold Fairbairn, IV, '09 (D).

Savard, Aime Albert, Jr., IV, '33 (B.T.C.).
Printing Department, United States Finishing Company, Norwich, Conn.

Savery, James Bryan, II, '23 (D).
Secretary, Stiles Lubricants, Inc., Hartford, Conn.

Sawyer, Henry Severance, VI, '32 (B.T.E.).
Treasurer, Sawyer, Regan Company, Dalton, Mass.

Sawyer, Richard Morey, VI, '27 (B.T.E.). (M.S., 1929, Massachusetts Institute of Technology.)
General Manager, Firestone Cotton Mills, Inc., Ft. Worth, Texas.

Scanlon, Andrew Augustine, IV, '26 (B.T.C.).

Schaetzle, Andre Paul, IV, '21 (B.T.C.).
Chief Chemist, Aspinook Corporation, Jewett City, Conn.

Schiffer, Clifford Elais, IV, '43 (B.T.C.).
Chemist, Process Engineering Department, Douglas Aircraft, Santa Monica, Calif.

Schiffer, Lathrope Adolph, VI, '41 (B.T.E.).
Production and Design Assistant, Wollman Mills, Inc., New York, N. Y.

Schlesinger, Morton, IV, '43 (B.T.C.).
Ensign, USNR.

Schneiderman, Jacob, III, '27 (D).
Golf Professional, Mt. Pleasant Country Club, Leicester, Mass.

Schoelzel, Herman Walter, IV, '35 (B.T.C.).
Overseer of Dyeing, Mascoma Mills, Lebanon, N. H.

Schreiter, Ehrich Ernest Max, VI, '26 (B.T.E.).
Representative, Sun Oil Company, Revere, Mass.

Schwarz, Herman Louis, IV, '22 (B.T.C.).
Textile Chemist, Sandoz Chemical Works, Inc., 61 Van Dam Street, New York City.

Scott, Gordon Maxwell, IV, '20 (B.T.C.).
Finisher, Princeton Worsted Mills, Inc., Trenton, N. J.

Shaber, Hyman Jesse, VI, '17 (B.T.E.). M.B.A., 1922 Harvard Graduate School of Business Administration.

Shafter, Stuart Frederic, IV, '42 (B.T.C.).
Ensign, U. S. Naval Reserve.

Shah, Kantilal Hiralal, VI, '36 (B.T.E.).
India.

Shah, Shantilal Hiralal, IV, '34 (B.T.C.). (M.B.A., 1936, Harvard Graduate School of Business Administration.)
India.

Shain, Joseph, IV, '35 (B.T.C.).
Dyer, Cowan & Shain, Haverhill, Mass.

Shanahan, James Edward, II, '22 (D).
Textile Inspector, Quartermaster Depot, U. S. War Department, Philadelphia, Pa.

Shananquet, Mrs. Lee (Woodies, Ida A.), IIIB, '00 (C).

Shann, William Edwin, II, '35 (D).
Research Engineer, Pacific Mills, Lawrence, Mass.

Shapiro, Jeffrey Jay, VI, '42 (B.T.E.).

Shapiro, Sidney, VI, '38 (B.T.E.).
U. S. Army Air Force.

Shapiro, Simon, VI, '34 (B.T.E.).
Partner, Lifco Webbing Company, Fall River, Mass.

Shea, Francis James, II, '12 (D).

Shea, John Francis, IV, '28 (B.T.C.).
N. E. Manager, Becco Sales Corporation, 207 A Street, Boston, Mass.

Shedd, Jackson Ambrose, III, '28 (D).
Stylist and Designer, Forstmann Woolen Co., Passaic, N. J.

Sheehan, Leo James, IV, '38 (B.T.C.).
Chief, Textile Laboratory, Quartermaster Depot, U. S. War Department, Jeffersonville, Ind.

Shelton, Charles Leopold, VI, '29 (B.T.E.).
Major, U. S. Army.

Shenker, Nahman, III, '25 (D).
Senior Textile Inspector, Federal Government, Brooklyn, N. Y.

Sidebottom, Leon William, IV, '11 (D).
Chief Chemist, B. B. Chemical Company, Cambridge, Mass.

- Siegel, Harold, VI, '43 (B.T.E.).**
Junior Mechanical Design Engineer, Crosley Corporation, Cincinnati, Ohio.
- Sigel, Mrs. A. E. (Calder, Marian B.), VI, '37 (M.S.).** (B.S. 1934, College of Industrial Arts, Texas State College for Women).
Senior Research Associate, Fabric Research Laboratories, Inc., 665 Boylston Street, Boston, Mass.
- Silberstein, Raymond, III, '39 (D), VI, '43 (B.T.E.).**
Inspector of Textiles, Philadelphia Quartermaster Depot, Philadelphia, Pa.
- Sill, Robert Herbert, VI, '43 (B.T.E.).**
U. S. Army.
- Silverman, Joseph Melvin, VI, '40 (B.T.E.).**
1st Lieut., U. S. Army.
- Sinski, Henry Anthony, VI, '41 (B.T.E.).**
U. S. Army.
- Sjostrom, Carl Gustof Verner, Jr., III, '17 (D).**
Designer and Assistant Superintendent, Dunn Woolen Co., Martinsburg, W. Va.
- Skalkaas, Basil George, IV, '41 (B.T.C.).**
U. S. Army, 2nd Chemical Company, Overseas.
- Skinkle, John Henry, IV, '42 (M.S.).** (B.S., Massachusetts Institute of Technology, 1924).
Assistant Professor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.
- Slamin, Alfred Francis, I, '26 (D).**
Sales Manager, Benjamin Franklin Paint and Varnish Company, Philadelphia, Pa.
- Sleeper, Robert Reid, IV, '00 (D).**
Textile Colorist, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.
- Smith, Allen Batterman, I, '26 (D).**
Turner Halsey Company, 40 Worth Street, New York City.
- Smith, Doane White, II, '10 (D).**
15 Oakland Street, Natick, Mass.
- Smith, Francis Dunham, VI, '42 (B.T.E.).**
U. S. Army.
- Smith, Frank Kenfield, II, '24 (D).**
Superintendent, Grout's, Ltd., St. Catharines, Ont.
- Smith, Harold, IV, '34 (B.T.C.).**
Chemist, Quartermaster Depot, Philadelphia, Pa.
- Smith, Herbert Jeffers, VI, '22 (B.T.E.).**
U. S. Ring Traveler Company, Providence, R.I.
- Smith, Lawrence, Lt. (SC) U. S. N., VI, '40 (M.S.).** (B.S., U. S. Naval Academy, 1932).
Naval Clothing Depot, Brooklyn, N. Y.
- Smith, Ralston Fox, I, '04 (C).**
2600 Norfolk Road, Cleveland Heights, Cleveland, Ohio.
- Smith, Roger Dennis, II, '27 (D).**
Assistant Superintendent, M. T. Stevens & Sons Co. (Pentucket Mills), Haverhill, Mass.
- Smith, Theophilus Gilman, Jr., IV, '10 (D).**
Farming, Groton, Mass.
- Snelling, Fred Newman, II, '03 (D).**
With the American Railway Express Company, Haverhill, Mass.
- Sokolsky, Henry, VI, '17 (B.T.E.).**
Production Manager, B. F. Sturtevant Company, Hyde Park, Mass.
- Somers, Benjamin, II, '25 (D).**
- Sood, George David, IV, '38 (B.T.C.).**
Technician in Research Department, Slatersville Finishing Company, Slatersville, R. I.
- Southwick, Charles Hudson, IV, '22 (B.T.C.).**
Assistant Dyer, Slatersville Finishing Company, Slatersville, R. I.
- Spalding, Arthur Ovila, IV, '32 (B.T.C.).**
Technical Man on Wool and Worsted, Sandoz Chemical Works, Inc., New York City.
- Spanos, James Peter, IV, '37 (B.T.C.).**
U. S. Army.
- Spevack, Edward, IV, '39 (B.T.C.).**
Cadet, U. S. Army Air Corps.
- Spiegel, Edward, I, '03 (C).**
- Stacey, Alfred Charles, IV, '30 (B.T.C.).**
Textile Technologist, Shoe Lace Company, Lawrence, Mass.
- Staklinski, Walter Albert, VI, '42 (B.T.E.).**
Junior Process Engineer, U. S. Rubber Co., Milwaukee Ordnance Plant, Milwaukee, Wis.
- Standish, John Carver, IV, '11 (D).**
Superintendent, Albany Felt Company, Albany, N. Y.
- Stanley, John Prince, Jr., IV, '29 (B.T.C.).**
Chemist, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.
- Stass, John George, II, '27 (D).**
Textile Analyst, Better Fabrics Testing Bureau, Inc., 101 West 31st Street, New York City.
- Steadman, Frank M., VI, '39 (M.S.).** (B.S., U. S. Military Academy, 1929).
Lieutenant-Colonel, U. S. Army, Director of Research & Development, Quartermaster Depot, Philadelphia, Pa.
- Stearns, Kenneth Lawrence, IV, '33 (B.T.C.).**
Dyeing Department, Merrimack Manufacturing Company, Lowell, Mass.
- Steele, Everette Vernon, IV, '24 (B.T.C.).**
Lieutenant, U. S. N. R.
- Stein, William Joseph, VI, '35 (B.T.E.).**
Executive, Milton C. Blum, Inc., New York, N. Y.
- Steinberg, Sidney, VI, '39 (B.T.E.).**
Corporal, U. S. Army.
- Stephens, Arnold George, I, '29 (D).**
Sgt., U. S. Army.
- Stevens, Raymond Russell, IV, '19 (B.T.C.).**
Chief Chemist, The Felters Company, Inc., Millbury, Mass.
- Stevens, William Edwin, I, '34 (D).**
With B. B. & R. Knight Corporation (Royal Mill), River Point, R. I.
- Stevenson, Murray Reid, III, '03 (C).**
- Stewart, Alexander, VI, '31 (B.T.E.).**
Labor Relations Director, Sanford Mills, Sanford, Me.
- Stewart, John Weeden, IV, '30 (B.T.C.).**
New England Representative, Aqua Sec. Corp., New York, N. Y.
- Stewart, Walter Lawrence, III, '03 (D).**
- Stiegler, Harold Winfred, IV, '18 (B.T.C.).** (M.S., 1922, Ph.D., 1924, Northwestern University).
Major, U. S. Chemical Warfare Service, Washington, D. C.
- Stohn, Alexander Charles, III, '06 (C).**
Factory and Production Manager, Carl Stohn, Inc., East Taunton, Mass.
- Stolzberg, Howard Nathaniel, IV, '35 (B.T.C.).**
Chemist in Charge of Production, George A. Goulston Co., Scituate, Mass.
- Stone, Ira Aaron, IV, '09 (D).**
Vice-President, Riverside Mills, Augusta, Ga.
- Storer, Francis Everett, II, '07 (D).**
Meredith, N. H.
- Storey, Alvin Briggs, VI, '28 (B.T.E.).**
Rayon Manufacturing, Celanese Corporation of America, Cumberland, Md.
- Stott, John Smith, III, '28 (D).**
With Newmarket Manufacturing Company, Lowell, Mass.
- Stowell, Eldon, A.B., I, '39 (D).**
Lieut. (j.g.), U. S. Coast Guard Reserve.
- Stronach, Irving Nichols, IV, '10 (D).**
Superintendent, Hampton Company, East-hampton, Mass.
- Strout, Kenneth Edward, III, '28 (D).**
Designer, United Elastic Corp., New Haven, Conn.
- Sturtevant, Albert William, IV, '17 (D).**
Foreman, Lowell Motor Sales, Inc., Lowell, Mass.
- Sturtevant, Fred William, IV, '26 (B.T.C.).**
Project Supervisor, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.
- Suhke, Waldo Eric, IV, '20 (B.T.C.).**
Teacher, Jefferson Junior High School, Meriden, Conn.
- Sullivan, John David, VI, '12 (D).**
With Robert Gair Company, Bradford, Mass.
- Sullivan, Lambert William, II, '23 (D).**
Boatswain Mate, 1st Class, U. S. Coast Guard, Receiving Station, Boston, Mass.
- Sullivan, Paul Henry, IV, '43 (B.T.C.).**
U. S. Army.
- Sullivan, Paul John, IV, '41 (B.T.C.).**
First Lieutenant, U. S. Army.
- Sullivan, Willard David, II, '23 (D).**
Breen's Store, Lowell, Mass.

- Sunbury, Herbert Ellsworth, VI, '18 (B.T.E.).**
Asbestos Sales Manager, U. S. Rubber Co., New York, N. Y.
- Sung, Harvey Chih, VI, '37 (B.T.E.).**
7 Min. Yuan Hsi Li, Colombo Road, Tientsin, China.
- Sutcliffe, Henry Mundell, II, '25 (D).**
Assembler, Norton Co., Worcester, Mass
- Sutton, Leslie Emans, I, '17 (D).**
Manager, Anniston Cordage Company, Anniston, Ala.
- Swain, Harry LeRoy, Jr., I, '26 (D).**
Purchasing Department, Firestone Tire & Rubber Co., Akron, Ohio.
- Swan, Guy Carleton, II, '06 (D).**
Chief Chemist and Assistant to Chief, U. S. Food and Drug Administration, 201 Varick Street, New York City.
- Swanson, John Harold, I, '28 (D).**
Superintendent, Dundee Mills, Inc., Griffin, Ga.
- Sweat, Safford Pershing, IV, '40 (B.T.C.).**
Captain, Field Artillery, U. S. Army.
- Sweeney, George Hamilton, II, '24 (D).**
Salesman, Walker Stetson Company, 147 Essex Street, Boston, Mass.
- Swiatek, Bronislaw John, VI, '40 (M.S.). (B.S., Tri-State College, 1938.**
U. S. Army.
- Swift, Rev. Edward Spooner, S. J., I, '02 (D)**
Administrator, Campion Hall, Jesuit House of Retreats, North Andover, Mass.
- Syme, James Francis, II, '00 (D).**
Vice-President and Director, Hayward-Schuster Mills, East Douglas, Mass.
- Symmes, Dean Whiting, IV, '22 (B.T.C.).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston, Mass.
- Szopa, Stanley, IV, '42 (B.T.C.).**
Ensign, USNR.
- Szymosek, Frank John, IV, '41 (B.T.C.).**
Ensign, U. S. Navy.

T

- Tamulonis, Edward William, VI, '30 (B.T.E.).**
Foreman of Research, Newmarket Manufacturing Company, Lowell, Mass.
- Tang, Hsiung-Yuan, I, '30 (D).**
- Tarpey, Thomas Joseph, IV, '27 (B.T.C.).**
23 Fremont Street, Somerville, Mass.
- Tarshis, Elias Aaron, IV, '28 (B.T.C.).**
Treasurer, Silver Line Dye Works, Inc., New York, N. Y.
- Tartikoff, Jordan Alvin, VI, '41 (B.T.E.).**
U. S. Army, A. C. Detachment, Chanute Field, Rantoul, Ill.
- Taylor, William Warren, VI, '43 (B.T.E.).**
Ensign, USNR.
- Teague, Charles Baird, II, '26 (D).**
U. S. Navy. Warrant Officer, Civil Engineer Corps.
- Teichner, Arthur Charles, IV, '43 (B.T.C.).**
U. S. Army.
- Thaxter, Joseph Blake, II, '12 (D).**
Sales Executive, Ludlow Manufacturing & Sales Corporation, 211 Congress Street, Boston, Mass.
- Thayer, Walter Stephen, VI, '40 (B.T.E.).**
- Thomas, Benjamin, Jr., VI, '34 (B.T.E.).**
Superintendent, Rayon Division, Jackson Mills, Nashua, N. H.
- Thomas, Donald Henry, IV, '42 (B.T.C.).**
Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
- Thomas, Henry Edward, VI, '40 (B.T.E.).**
Engineering Draftsman, C. G. Sargent's Sons Corp., Graniteville, Mass.
- Thomas, Robert Joseph, IV, '34 (B.T.C.). (M.S., 1937, Ph.D., 1939, University of Notre Dame.)**
Supervisor, E. I. du Pont de Nemours & Company, Inc., Carney's Point, N. J.
- Thomas, Roland Vincent, I, '05 (C).**
With Chicopee Sales Corporation, 40 Worth Street, New York City.
- Thompson, Arthur Robert, Jr., IV, '22 (B.T.C.).**
Salesman, Ciba Company, Inc., Charlotte, N. C.

- Thompson, Everett Leander, I, '05 (D).**
53 Morse Avenue, Brockton, Mass.
- Thompson, George Robert, IV, '35 (B.T.C.).**
Chemical Engineer, Sylvania Electric Products, Inc., Salem, Mass.
- Todd, Walter Ernest, III, '23 (D).**
Agent, Metropolitan Life Insurance Company, Uxbridge, Mass.
- Toepler, Carl, IV, '22 (B.T.C.).**
Superintendent of Permanent Finish Department, Bellman Brook Bleachery Company, Fairview, N. J.
- Toher, Francis Luke, IV, '32 (B.T.C.).**
In Charge of Dyeing, Lebanon Knitting Mill Company, Pawtucket, R. I.
- Topjian, Leon, IV, '30 (B.T.C.)**
416 Massachusetts Avenue, Boston, Mass.
- Toshach, Reginald Alexander, II, '11 (D).**
Proprietor, Toshach's Mill Remnants, Haverhill, Mass.
- Toupin, Stephane Frederick, VI, '24 (B.T.E.).**
Plant Engineer, Regent Knitting Mills, Ltd., St. Jerome, Quebec.
- True, William Clifford, II, '22 (D).**
Assistant Superintendent, Ludlow Manufacturing & Sales Co., Allentown, Pa.
- Turcotte, David Henry, IV, '33 (B.T.C.).**
Salesman, Bradt Bakery, Lowell, Mass.
- Turner, George Robert, IV, '41 (B.T.C.).**
Chemist, E. I. du Pont de Nemours & Co., Deepwater Point, N. J.
- Tyler, Bernard James, IV, '36 (B.T.C.).**
Secretary, Albi Chemical Corp., New York, N. Y.
- Tyler, Lauriston Whitcombe, II, '16 (D).**
Manager, W. T. Grant Company, Brunswick, Me.
- Tyrie, Wallace Rolley, IV, '43 (B.T.C.).**
With General Electric Company, Plastic Division, Pittsfield, Mass.

U

- Urlaub, George Samuel, IV, '41 (B.T.C.). '42 (M.S.).**
U. S. Army Air Corps, Maintenance Engineer

V

- Valente, Louis Joseph, VI, '43 (B.T.E.).**
U. S. Army.
- Valentine, Burnet, VI, '23 (B.T.E.).**
Vice-President, Moraff Craig Co., Inc., and with A. D. Juilliard & Co., Inc., New York, N. Y.
- Valentine, Preston Sumner, IV, '36 (B.T.C.).**
Assistant Chemist, American Safety Razor Corporation, Brooklyn, N. Y.
- Valvanis, Nicholas John, IV, '40 (M.S.). (B.S., Massachusetts State College, 1939.)**
Textile Chemist, A. M. Tenney Associates, Inc., New York City.
- Vaniotis, Socrates Vasilios, IV, '37 (B.T.C.).**
Colorist-Experimental Padder Research, Sidney Blumenthal & Co., Inc., Shelton, Conn.
- Varnum, Arthur Clayton, II, '06 (D).**
U. S. Textile Inspector.
- Villa, Luis Jorge, IV, '25 (B.T.C.).**
With Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia, S. A.
- Villa, William Horace, VI, '24 (B.T.E.).**
Technical Director, Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia, S. A.
- Villeneuve, Maurice Arthur, II, '26 (D).**
Corp., U. S. Army.
- Vincent, William Henry, III, '26 (D).**
18 Albion Street, Hyde Park, Mass.

W

- Wagner, George Frederic, Jr., VI, '38 (B.T.E.).**
Superintendent, Gonvic Mfg. Co., Gonvic, N. H.
- Walen, Ernest Dean, VI, '14 (B.T.E.).**
Vice-President, Pacific Mills, Worsted Division, Lawrence, Mass.
- Walker, Alfred Schuyler, II, '11 (D).**
67 Park Avenue, Saranac Lake, N. Y.

- Walker, Anna Gertrude, IIIb, '03 (C).
See Pradel, Mrs. Alois J.
- Walker, Raymond Scott, II, '23 (D).
Production Superintendent, Arlington Mills,
Lawrence, Mass.
- Walker, Samuel J., IV, '32 (B.T.C.).
Lieut. (j.g.), USNR.
- Wall, James Thomas, II, '43 (D).
Aviation Cadet, U. S. Army Air Corps.
- Wallace, Joseph Max, IV, '31 (B.T.C.).
- Wang, Chen, IV, '23 (B.T.C.).
- Wang, Cho, VI, '23 (B.T.E.).
- Wang, Tung Chuan, VI, '23 (B.T.E.).
- Wang, Yun-Cheng, VI, '31 (B.T.E.).
Assistant Manager, Sung Sing Cotton Mill
No. 1, Shanghai, China.
- Wang, Yung Chi, II, '21 (D).
Pu Yi Silk Weaving Factory, Chiating,
Szechuen, China.
- Ward, George Chester, IV, '28 (B.T.C.).
Research Chemist, Celanese Corporation of
America, Cumberland, Md.
- Warren, E. Maybelle, IV, '28 (B.T.C.).
See McBee, Mrs. Damon F.
- Warren, Philip Hamilton, II, '05 (D).
Superintendent, Hopeville Manufacturing
Company, Worcester, Mass.
- Washburn, John Milton, Jr., IV, '21 (B.T.C.).
New England Manager, Emery Industries,
Inc., 187 Perry Street, Lowell, Mass.
- Watson, William, III, '11 (D).
Real Estate, Frank E. Watson, 50-54 Merri-
mack Street, Haverhill, Mass.
- Webb, Ralph Peabody, VI, '42 (B.T.E.).
Assistant Overseer, Nashua Blanket Company,
Jackson Mill, Nashua, N. H.
- Webber, Arthur Hammond, IV, '01 (D).
Research, B. B. Chemical Co., Cambridge,
Mass.
- Weber, Alfred Julius, II, '43 (D).
Aviation Cadet, U. S. Army Air Corps.
- Webster, Joseph Albert, VI, '23 (B.T.E.).
Production Manager & Raw Material Buyer,
Stehli & Co., Inc., New York, N. Y.
- Weil, Clarence Bernard, IV, '41 (B.T.C.).
Ph.M. 3/c, U. S. Navy
- Weinbeck, Mrs. John C. (Robbins, Lucy W.),
VI, '37 (B.T.E.).
102 South Loring Street, Lowell, Mass.
- Weinstein, Edward Joseph, VI, '25 (B.T.E.).
Harrison Hardware Company, Harrison, N. Y.
- Welch, William Paul, Jr., IV, '36 (B.T.C.).
Insurance Agent, Boston Mutual Life Insurance
Company, Lowell, Mass.
- Wells, Al Edwin, VI, '20 (B.T.E.). (Ed.M. 1937,
Boston University.)
Assistant Professor, Textile Engineering De-
partment, Lowell Textile Institute, Lowell,
Mass.
- Wells, Henry Alfred, IV, '33 (B.T.C.).
Assistant Manager, Scrap Control, Wright
Aeronautical Corporation, Paterson, N. J.
- Westaway, John Chester, VI, '28 (B.T.E.).
Secretary-Treasurer, W. J. Westaway Co., Ltd.,
Hamilton, Ont., and Vice-President, Sonoco
Products Company of Canada, Ltd., Brant-
ford, Ont.
- Westbrooke, Clayton Collington, IV, '29
(B.T.C.).
Chemist, Bigelow-Sanford Carpet Company,
Thompsonville, Conn.
- Wetherbee, Francis Putney, I, '28 (D).
Vice-President, Flint River Cotton Mills,
Albany, Ga.
- Whaton, Walter Francis, VI, '23 (B.T.E.).
Buyer, Gemung's, Inc., New York City.
- Wheelock, Silas Mandeville, Jr., II, '39 (D).
With Smith & Winchester Company, South
Windham, Mass.
- Wheelock, Stanley Herbert, II, '05 (D).
President and Treasurer, Stanley Woolen
Company, Uxbridge, Mass.
- Whitcomb, Roscoe Myron, IV, '10 (D).
Druggist, The Rexall Store, Ashland, N. H.
- White, Royal Philip, II, '04 (D).
Resident Manager, American Woolen Com-
pany, Sawyer Mills, Dover, N. H.
- Whitehill, Warren Hall, IV, '12 (D).
Overseer, Pacific Mills, Worsted Department,
Lawrence, Mass.
- Whiting, Mrs. Frank E. (Macdonald, Barbara
T.), III, '43 (D).
310 Wilson Avenue, Rumford, R. I.
- Wiech, Raymond Edward, IV, '29 (B.T.C.).
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With Rhode Island Worsted Company, Staf-
ford Springs, Conn.
- Wightman, William Henry, IV, '06 (D).
Technical Salesman, Ciba Company, Inc.,
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(B.T.C.).
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- Wilkinson, Vernon Lee, I, '42 (D).
Lieut., A.A.F.
- Williams, Albert William, III, '32 (D).
Designer, Manhattan Shirt Company, New
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- Williamson, Douglas Franklin, I, '22 (D).
Superintendent, Plant 3, Granite Falls Manu-
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- Wilman, Rodney Bernhardt, II, '25 (D).
Superintendent, New England Fibre Blanket
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- Wilson, Raymond Bachman, II, '36 (D).
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- Wingate, William Henry, IV, '08 (D).
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Ensign, USNR.
- Wolf, Irving Paul, IV, '42 (B.T.C.).
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- Woo, Tsunkwei, VI, '19 (B.T.E.).
- Wood, Ernest Hadley, S.B., IV, '11 (D).
- Wood, James Carleton, IV, '09 (D).
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See Lane, Mrs. Joseph J. 2nd.
- Woodard, Malcolm Russell, IV, '40 (B.T.C.).
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- Woodcock, Eugene Close, II, '07 (D).
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- Woodies, Ida Alberta, IIIb, '00 (C).
See Shanahan, Mrs. Lee.
- Woodman, Harry Lincoln, I, '02 (C).
Salvage Foreman, Monsanto Chemical Com-
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- Wright, George Ward, IV, '38 (B.T.C.).
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- Wu, Tsung-Chieh, VI, '25 (B.T.E.).
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Y

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- Yavner, Harry, II, '12 (D).
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- Young, Edmund Joseph, Jr., IV, '33 (B.T.C.).
- Yung, E-Zung, I, '32 (D).

Z

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- Zenorini, Henry John, VI, '43 (B.T.E.).
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Moody Street and Colonial Avenue

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LOWELL EVENING TEXTILE SCHOOL

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FOR TERM ENDING JUNE 30, 1945

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FOR TERM ENDING JUNE 30, 1946

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CALENDAR—1944

September 21, Thursday	Registration
September 28, Thursday	Registration
October 2, Monday	Opening of evening school
October 12, Thursday	Columbus Day—Holiday
November 11, Saturday	Armistice Day—Holiday
November 23–24, Thursday and Friday	Thanksgiving Recess. No classes
December 20, Wednesday	End of first term

1945

January 4, Thursday	Opening of second term
March 2, Friday	Closing of evening school

GENERAL INFORMATION

Entrance Requirements

All applicants to the evening classes must understand the English language and simple arithmetic. Those who are graduates of a grammar or high school are admitted upon certificate. Those who cannot present such a certificate are required to take examination in the subjects of English and arithmetic. In the examination in English a short composition must be written on a given theme, and a certain amount must be written from dictation. In the examination in arithmetic the applicant must show suitable proficiency in addition, subtraction, multiplication, division, common and decimal fractions, percentage, ratio and proportion. Opportunity to register or to take these examinations is offered each year, generally on the Thursday evenings of the two weeks previous to the opening of the evening school.

Registration

Before entering the class a student must fill out an attendance card, which can be obtained at the office or from the instructors in the various departments.

Any student who has filed an attendance card and who wishes to change his course must notify the office before making the change.

Sessions

The evening classes commence the first Monday of October and continue for twenty weeks. The school is open on four evenings each week during the period mentioned, except when the school is closed for holiday recesses.

Supplies

Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Students' supplies will be sold from the co-operative store every evening school night from 6.45 to 8.15 P.M.

Fees and Deposits

All evening courses are free to residents of Lowell, but students must file a certificate of residence signed and sealed by the city clerk of Lowell. Those who do not file such certificate will be considered non-residents.

To non-residents of Lowell the fee is \$10 per year for *each course of two nights per week*. Students taking two courses or attending courses requiring more than two nights per week are required to pay \$15 per year for three nights and \$20 for four nights.

All fees and deposits must be paid in advance.

All students, whether from Lowell or not, taking Course 411, Chemistry and Dyeing Department, are required to make a deposit at the commencement of the course—\$5 for first-year students, and \$10 for second-year students. A deposit of \$10 will be required of all students taking Course 412, 413 or 414. This is to cover the cost of laboratory breakages, chemicals, apparatus, etc., and at the end of the year any unexpended balance is returned, or an extra charge made for the excess breakage.

All students taking Machine-Shop Practice will be required to make a deposit of \$5. Any unexpended balance remaining at the end of the year will be returned to the student.

Report of Standing

A report of standing covering the year's work is sent to all students who attend the entire year and take the necessary examinations.

Certificates

The courses of the evening school are varied and arranged to meet the special needs of those engaged in the industry. They vary in length from one to four years, and at the completion of each course the certificate of the school is awarded, provided, however, that the student has been in attendance in the course during the year for which the certificate is granted.

GENERAL EVENING COURSES

The object of these courses is to give young men of ambition an opportunity to obtain instruction in all the branches of science that are allied with their daily work. For example, one who is employed as a weaver in a textile mill may obtain knowledge of the manufacture of yarn, the production of a design, and the methods of finishing a fabric, as well as the manner of its weaving or knitting. In like manner the dyer may augment his knowledge of the chemicals and materials he is daily handling. The engineer and machinist may acquire a knowledge of the mathematics, science of mechanics, electricity and drawing that underlie all the work of an engineer.

It is recognized that the interests of such students lie in a particular field of industry, and these courses are designed to bear directly upon the special line, and supplement, as far as possible, the practical work in which the student is engaged during the day.

In a word, any man having a common school education and the ambition to advance in his line may now secure a broad and comprehensive training in the subjects which will be of vital importance to him in obtaining the goal of his ideal.

A description of all courses follows.

COTTON DEPARTMENT

The courses offered in the Cotton Department are intended for those interested in cotton yarn manufacture and sales. In addition to the value for those directly connected with the carding and spinning departments, the courses offer an opportunity for students who are working in the mill office or the selling office. Men selling supplies to cotton mills will find in these courses an opportunity to become acquainted with the business and its problems which will make possible a more complete service to their customers.

111. Cotton Yarns—2 Years

The *first year* work in cotton yarn manufacture includes a study of cotton and its preparation for market, followed by a study of opening, picking, carding and combing. This work consists of lectures on these operations combined with problems that are peculiar to each operation such as the drafts used, the production of each process and the amounts of waste made. Special consideration is given to the adjustment and care of these machines and some laboratory demonstration is used to show the manner of adjusting machines for the purpose of controlling the weight of the product, the amount of work done in a day and the amount of waste made.

Two evenings each week.

COTTON.—This course starts with a study of cotton growing, the areas producing cotton and the characteristics of cottons from the various producing areas. The effects of seed selection, cultivation, and weather conditions on the cotton are emphasized.

Picking and ginning of cotton are studied to show the importance of proper preparation of lint for mill consumption.

There is a general survey of the intricate cotton marketing system, illustrating the methods of specifying cotton desired and securing delivery at a known price.

OPENING AND PICKING.—As this equipment has changed considerably in recent years, special notes are used illustrating modern machinery and its arrangement. Machine parts, construction and adjustment, are discussed in the classroom and demonstrated in the laboratory. Mixing of cottons for colored work or for price control is considered under these processes.

CARDING.—The process of carding is considered one of the most important, and proper time is devoted to the construction and operation of cards that the student may be familiar with the various parts of the card and the function and design of each. The construction and application of card clothing, and the methods of grinding form a part of the work. Some time is given to a discussion of the waste made in carding, the regulation of the amounts of each made and the calculation of the percentages. New and special attachments for various purposes are brought to the attention of the class, illustrating possible ways of improving carding conditions.

COMBING.—The preparation of card sliver for combing by means of the sliver lapper and ribbon lapper is thoroughly considered. The combing operation itself is studied in considerable detail, emphasizing the general object and operations in

combing and the specific means employed by various types of combs in performing the operations. The calculations in this connection involve the drafts and doublings necessary to produce the proper lap for the comb, the proper comb drafts, and the determination of the per cent of noil produced.

The *second year* work in cotton yarn manufacture includes a study of the operations of drawing, roving, spinning, winding and twisting. The work consists largely of lectures and problems with some laboratory demonstrations to make the student familiar with the machines and the points of adjustment.

Two evenings each week.

DRAWING.—The instruction on drawing introduces the principles of roller draft and the theory of doublings. Special attention is given to roll covering materials and their application. The measurement of uniformity of slivers by various methods is considered here.

ROVING.—Roving includes the various machines known as the slubber, intermediate, fine and jack fly frames. Each of the various motions of these complicated machines is treated separately and then the group is taken as a unit, tying each operation in with the others. Particular attention is paid to the subjects of lay and tension because of their importance in producing perfect roving. The calculations in this subject involve draft, twist, lay and tension with particular attention to the derivation of constants and their use. The new systems of long draft for roving frames are included in this work.

RING SPINNING.—A study of the various types of yarns gives the student an appreciation of the necessary characteristics for various purposes and how these may be obtained. Standard draft and long draft systems are studied in detail. Important machine parts, such as guides, travelers, rings and builders, their adjustment and care, form an important part of this subject. Yarn faults and defects are shown and their causes explained.

SPOOLING AND WINDING.—The discussions under this head cover the treatment of single yarns in preparation for twisting, comparing the relative merits of spooling with multiple winding on tubes, and beaming for special twiststers. Winders are also considered as a means of preparing yarn packages for sale yarns.

TWISTING.—Because of the similarity to ring spinning, the emphasis here is more on the manufacturing part of the work, although there are a few peculiar features of a mechanical nature. The twisting of various regular ply yarns, the making of numerous fancy yarns and the principles underlying the production of various patterns are taken up. The use of special twiststers and other apparatus for cords and ropes is considered under this heading.

113. Knitting—1 Year

This is a general course on the manufacture of knitted fabrics and garments, intended for those interested in the principles of knitting and a study of the mechanisms of a variety of knitting machines. The more important phases of the course are:—

YARNS AND YARN SIZING SYSTEMS.—In order that the student may understand the distinctions between yarns, terminology, and the various sizing systems commonly used, several lectures are devoted to yarn characteristics and sizing as a basis for the entire course. This covers cottons, woolens, worsteds, silks and rayons.

FLAT MACHINES.—These relatively simple machines make a fine starting point in establishing clearly the action of the latch needle and how it is operated. Lamb, Dubied, Grosser, and Links and Links machines are used as a basis for this part of the work.

SMALL CIRCULAR RIBBERS.—These machines are a very logical step, following flat machines. Brinton, Wildman, and Universal ribbers, with different pattern mechanisms, are used in illustrating this type of work.

AUTOMATIC HOSIERY MACHINES.—This section of the course is built around the various Banner and the Scott and Williams half and full hose machines. Most of the work is done with the plain machines as there is not sufficient time to include the fancy pattern type.

LARGE RIBBERS AND SPRING NEEDLE MACHINES.—Underwear fabric and webbing are produced on this type of equipment. Scott and Williams, Wildman, Tompkins and Crane machines are the basis for instruction along these lines.

FULL FASHIONED MACHINE.—A brief study of the full fashioned principles and actions is based on the Reading 18-section machine in the laboratory.

WARP KNITTING.—Using the Raschel machine in the laboratory, a general study of warp knitting includes Tricot and Milanese work also.

ANALYSIS.—During the study of the various machines, considerable attention is given to the many "stitches" possible. This, coupled with the lectures on fabric and hosiery analysis, covers the common analysis problems.

ROUTINES.—The usual sequence of manufacturing processes for hosiery and underwear are studied with the idea of illustrating the steps necessary in producing different articles.

Most of the instruction in this course is given by lectures. As many of these machines are small, it is common practice to bring the machine under discussion into the classroom so that students may see the machine and parts being considered. In other instances, the class may go into the laboratory to see the equipment and its operation.

Two evenings each week.

114. Cotton Organization—1 Year

This course, offered only to those who have completed the work in Carding and Spinning, is a study of the common arrangements of drafts, sizes and production details for manufacturing various cotton yarns. Illustrative problems demonstrate how to provide for "balancing" a mill or how to divide equipment to produce different yarns in given quantities.

Some time is devoted to discussing various common machinery layouts and the number of operatives required for certain manufacturing arrangements. Typical mill job analysis problems involving time study and end breakage tests are considered.

Two evenings each week.

WOOLEN AND WORSTED DEPARTMENT

211. Woolen Yarns—1 Year

Instruction consists of lectures covering all details of woolen yarn manufacture. This covers all the operations in detail necessary to manufacture yarns from raw stock on the woolen principle, and includes lectures and laboratory work on burr picking, wool blending, mixing, picking, wool oils and emulsions, carding, spinning on both mule and ring frame, and plain and novelty twisting.

Reworked fiber and wool waste is covered in detail from rag sorting to finished staple.

Two evenings each week.

217. Wool and Top Making—1 Year

Instruction consists of lectures in technology of wool fibers and worsted carding and combing.

RAW MATERIALS.—The study of raw materials which enter into the manufacture of woolen or worsted yarns or hardened felts, or are made into yarns by processes similar to those employed in the manufacture of woolen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel hair, cut staple rayon, etc. In connection with these are considered shoddy, noils, and extracts.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lectures. The various characteristics and properties are explained, as are also trade terms, such as Fine, $\frac{1}{2}$ -blood, $\frac{3}{8}$ -blood, 56^s, 36^s, B super, delaine, braid, etc. Over 1,500 samples of wool and other fibers gathered from all the countries of the world are catalogued and are available for inspection and study. Wool shrinkages are studied as are also spinning qualities. A complete collection of literature pertaining to sheep, wool, etc. is available for outside reading or study.

WOOL SCOURING.—The objects of scouring or degreasing and the methods employed are explained. This involves the consideration of soaps and chemicals used in scouring and degreasing, also the waste products and their utilization. A sorted lot of grease wool is scoured by machines that are made similar in operation to regular commercial wool scouring machines. At the same time the use of driers, their operation and regulation, is taken up.

CARBONIZING.—The methods of carbonizing wool, noils, burr waste, rags, etc. are studied. If time permits, a commercial quantity of stock is carbonized on the regulation carbonizing machines in the wool laboratory.

CARDING.—The different types of worsted cards are studied in detail, as well as the construction, setting and operation of cards. A part of this work consists of a study of card clothing, its construction, application, grinding, setting, etc.

COMBING.—This branch takes up the preparing processes, backwashing, also gilling of the stock before and after combing. The construction of the gill boxes and Noble comb is studied by lectures. Two Noble combs are available for inspection and study.

The French comb is studied, and the various calculations to determine draft, noiling, productions, etc., are made.

Two evenings each week.

218. Worsted Yarns—1 Year

Instruction is devoted to detail study of the English and French systems of worsted yarn manufacture.

DRAWING AND SPINNING.—The equipment in the laboratory offers opportunity to make worsted yarn by either the Bradford or open drawing system or by the French system. The process includes the various machines in the successive steps of making Bradford spun yarn, and the functions of the different machines are studied. In the latter, or French system, the stock is run through the drawing machines, and the roving spun into yarn on the worsted mule or frame. The same method of studying the mechanism and operations of these machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

With the instruction in spinning by the Bradford system is given work on the twistors and the effects that may be produced.

Two evenings each week.

TEXTILE DESIGN AND WEAVING DEPARTMENT

311. Cotton Design—3 Years

During the *first year* instruction is given in elementary designing, starting with all the foundation weaves which may be used in fabrics such as the plain weave, rib weaves, basket weaves, twill weaves, satin weaves, granite weaves, etc. Combination and derivative weaves are made up from the aforesaid weaves. Fancy and figured weaves, in most cases originated by the student, are produced. Color effects, which are so essential in fabrics, obtainable from the different weaves, as stated above, in which the color arrangement of warp and filling create the pattern, are thoroughly considered. Not only the designing, but also harness drafting and the making of dobby chains for all type of weave is taken up.

Cloth analysis is considered in conjunction with designing, as a designer must know the kind of fabric he is designing, what material and what size of yarns are to be used, and how heavy and costly the cloth is to be. The various topics discussed are the sizes or counts of yarns made from all kinds of fibers, such as cotton, woolen, worsted, silk, rayon, jute and yarns of other vegetable fibers. Their relative length to the pound is determined in the single two or more ply, mixed yarns, novelty yarns and fancy yarns, in the American or English system. The same is given in the metric system. Problems involving the take-up of yarns in the weaving and finishing process are given. Samples of cloth are picked apart to determine their weaves and general construction.

Two evenings each week.

In the *second year* cloth analysis and design are combined in lecture and practice, starting with plain and leading into the more fancy cotton dobby fabrics. A great variety of samples of cloth are used in class work to determine ends and picks per inch, shrinkage in warp and filling, and the number of reed and reed widths necessary for eventual reconstruction. The yarn numbers of warp and filling are determined by aid of fine balances. The amount of warp and filling necessary for a piece of

goods is calculated and the weight of a whole piece as well as the number of yards per pound are determined.

Two evenings each week.

In the *third year* more elaborate cloths are considered, both in designing and analysis, cloths in which extra warp or extra filling, or both, are used. Warp backed, filling backed, double, triple or more plied fabrics are taken up, such as marseilles, quilting, pique, suspenders, narrow webbings, velveteens, fancy velveteens, velvets, corduroys, Bedford cords, plushes, leno, in fact, anything a student may suggest which might help him in his work.

Two evenings each week.

312. Woolen and Worsted Design—3 Years

This course covers the design and analysis of standard woolen and worsted fabrics and is intended for those who wish to specialize in this branch of textile fabric manufacture. Special and fancy fabrics are studied to the extent that time will permit.

During the *first year* instruction is given in the subject of classification of fabrics, use of points or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks and stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

The analysis of samples is taken up in a systematic manner, illustrating the various cloth constructions for the purpose of determining the design of the weaves and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric.

Two evenings each week.

During the *second year* instruction is given in cotton warp goods, blankets, bath robes, filling reversible, extra warp and filling backs, figured effects produced by extra warp and filling, double cloths and plaid backs.

The analysis work follows as closely as possible the type of fabrics taken up in the designing and the reconstruction of these fabrics with the consideration of their shrinkage and composition.

Two evenings each week.

In the *third year* instruction is given in multiple fabrics, chinchilla, Bedford cords, crepon, matelasse and imitations, double plains, meltons, kersey, plush and suitings. At this time also is taken up the construction of designers' blankets, suggestion cards, and the construction of samples.

The construction of new fabrics from theoretical viewpoint together with the construction from suggestion cards is taken up. In connection with this work instruction is given in making cost estimates for both woolen and worsted fabrics.

Two evenings each week.

313. Decorative Art—3 Years

During the first ten weeks the work consists of charcoal drawing from plaster models and group arrangements of still life. The second ten weeks deals with pastel drawing of still life groups, depending upon the progress and interest of the students.

Two evenings each week.

During the second year instruction is given in figure drawing from the model.

Two evenings each week.

In the third year the student chooses one of the following options:

1. Color Harmony—its mixes and uses.
2. Perspective—a mechanical method of correct drawing.

Two evenings each week.

314. Show Card Design—2 Years

LETTERING.—During the *first year* the student is taught to master the drawing,

with pencil, of a few very plain alphabets, both upper and lower case letters, also plain figures. With the characteristics of plain letter alphabets well in mind, it is but a few steps to make any of the more intricate ones. Following this he will make simple "lay-outs" of plain card signs, and then take up the lettering, with brush and paint, of some of his simple card designs.

Two evenings each week.

The second year is simply a continuation of the latter part of the first year work, with the addition of advanced design in the "lay-out" and color-scheme of practical show cards and posters, such as are designed and lettered in the up-to-date Show Card Shop of to-day.

Two evenings each week.

316. Pattern Alteration—1 Year

This includes a general understanding of the alteration of the commercial pattern as well as alterations for the student's own figure problems.

Two evenings each week.

321. Cotton Weaving—1 Year

The Course in Cotton Weaving covers instruction on plain looms, Draper Automatic and Stafford Automatic looms. It includes instruction on the construction of shedding and picking motions, take-up and let-off motions together with the operation of the magazines and hoppers and methods of changing shuttle and bobbin. A study is also made of the preparation of warps, beaming, sizing and drawing-in. The Crompton and Knowles Automatic Towel Looms, and the various types of box looms, including chain building and work on multipliers, are also considered in this course.

Two evenings each week.

322. Woolen and Worsted Weaving—1 Year.

This course includes instruction on the Crompton and Knowles loom and takes up general construction, head motions, take-up, let-off, filling stop motion, etc. The preparation of warps, wet and dry dressing, is given in connection with this course.

Two evenings each week.

324. Loom Fixing—1 Year

The course in Loom Fixing takes up the timing of all the different motions in the loom, such as the shedding, picking, and adjustment of the shuttle boxes on the 4 x 4 Crompton & Knowles and Draper box and automatic looms, and the setting for the Baker shuttle changing mechanism.

In addition there are many trouble hints given and the various remedies for improper setting. Box chain and harness chain planning and building is also taken up.

Two evenings each week.

CHEMISTRY AND DYEING DEPARTMENT

Hardly any branch of applied science plays so important a part in our industrial world as chemistry. Many large mills employ chemists as well as dyers, and with the great progress which is being made in the manufacture and application of dye-stuffs, a basic knowledge of chemistry becomes an absolute necessity to the dyer. Within a comparatively short distance from Lowell are establishments employing men who require some knowledge of chemistry but who may not necessarily use dyes. Some find a knowledge of analytical chemistry helpful in their everyday work.

To meet these varying needs of our industrial community, the school offers a two-year course in general chemistry, organic and inorganic, which may be followed by any one of three courses, viz., textile chemistry and dyeing, analytical chemistry, and textile and analytical chemistry. In order to take Course 412, 413 or 414, candidates must have a certificate from Course 411, or show by examination or approved credentials that they have taken the equivalent of the work covered by this course.

411. Elementary Chemistry—2 Years

General Chemistry, including Inorganic and Organic.

Qualitative Analysis.

One lecture and one Laboratory Period per week in General Chemistry the first year, continued three nights a week during the second year, when the Elementary Organic Chemistry and Qualitative Analysis is completed.

Instruction in Elementary Chemistry extends through two years, and includes lectures, recitations and a large amount of individual laboratory work upon the following subjects:—

THEORETICAL CHEMISTRY.—Chemical action, chemical combination, combining weights, atomic weights, chemical equations, acids, bases, salts, Avogadro's law, molecular weights, formulæ valence, periodic law, etc.

NON-METALLIC ELEMENTS.—Study of their occurrence, properties, preparation, chemical compounds, etc.

METALLIC ELEMENTS.—Study of their occurrence, properties, metallurgy, chemical compounds, etc.

The students take up, as thoroughly as time will permit, the qualitative detection of the more common metals and non-metals, with practical work.

This work, although necessarily elementary, is intended to prepare the student to study more understandingly the manufacture of dyestuffs and coal tar colors in the more advanced courses which follow.

During the *first year* of the Elementary Chemistry course most of the time is devoted to the non-metals and theoretical chemistry, and the laboratory work covers briefly the non-metals.

Two evenings each week.

During the *second year* the classroom work is upon metals and the hydrocarbons and their derivatives, and the laboratory work consists entirely of Qualitative Analysis. While this course is necessarily taken up in an abbreviated and elementary manner, it is so arranged that the students may become familiar with the separations and the detections of the common metals and acids. This course is also preliminary to the work given in Analytical Chemistry.

Three evenings each week.

412. Textile Chemistry and Dyeing—3 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Dyeing.

Three evenings each week.

Covered by 60 lectures and two nights of laboratory work per week.

The outline of the lecture course given in Textile Chemistry and Dyeing is as follows:—

TECHNOLOGY OF VEGETABLE FIBERS.—Cotton, linen, jute, hemp, china grass. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ANIMAL FIBERS.—Wool, mohair, silk. Chemical and physical properties, chemical compositions, microscopical study, and their action with chemicals, acids, alkalies and heat.

TECHNOLOGY OF ARTIFICIAL FIBERS.—Study of the various forms of artificial silk, the process of manufacture, their properties and action with chemicals, acids and heat.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching, action of soap.

The bleaching of cotton is studied with description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is included a study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods of degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods of detection, their effect during the different operations of bleaching, scouring, dyeing and printing, and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING, AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds not dyestuffs that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting principles and leveling agents.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, tumeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used in recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown, iron buff.

ARTIFICIAL COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and systematic experiments the student learns the nature of the various dyestuffs and mordants, their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool and silk, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye baths, etc.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines.

413. Analytical Chemistry—3 Years

Laboratory Work and Lectures in Quantitative Analysis.

Three nights each week of class-room and laboratory work.

The object of this course is to give the student a general idea of the underlying principles of Analytical Chemistry, with a sufficient amount of laboratory work to enable him to become proficient in performing the ordinary routine analysis of the textile plant. Frequent recitations are held for the discussion of methods and the solution of stoichiometrical problems.

The work covered the first two years is based on Smith's "Quantitative Analysis," and for the advanced work, consists of the analysis of soap, water, oils, coal and other materials of particular interest to the textile chemist. Special lecture notes are given and Griffin's "Technical Methods of Analysis" is used as a text.

414. Textile and Analytical Chemistry—4 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Analytical Chemistry.

Combines all lectures in Textile Chemistry and Dyeing with work of Course 413, but does not include any Dyeing Laboratory.

Three evenings each week.

415. Chemistry and Technology of Leather—1 Year

Requirements: Two years of evening elementary chemistry and two years of inorganic quantitative analysis. A student without this preparative background or its equivalent will not be admitted to this course.

This is a one year course and treats of the chemistry and technology of leather manufacture. All the tannery processes are taken up with special emphasis on the purpose of each operation. In respect to the chemistry involved a short introduction to the chemistry of proteins and fats and the action of enzymes is presented, and the usual analytical methods are considered. Throughout the course mention is made of recent developments and fields of research.

The early part of the course consists entirely of lectures (three one-hour periods). The latter part consists of one weekly lecture and a two-hour laboratory session.
Two evenings each week.

ENGLISH DEPARTMENT

511. English Composition—2 Years

First Year.—REMEDIAL ENGLISH AND RHETORIC.—In order to write well it is necessary to have a thorough understanding of grammar. Moreover, it is a great satisfaction to know why you are correct in speaking and writing in a certain way. This course is designed to give a comprehensive survey of necessary grammatical and rhetorical principles. The course of instruction consists of lectures, recitations, remedial exercises, and the study of a text book.

One evening each week.

Second Year.—THE PRINCIPLES OF COMPOSITION.—This is an advanced course and is not open to students who have not completed the first year or its equivalent. The primary purpose of this course is to give the student the ability to write clearly and correctly. An intensive study is made of the four divisions of composition—narration, description, exposition, and argumentation—and the art of letter writing. Selections from various authors to be read for general interest and for the purpose of illustration, are assigned for outside reading. Lectures are given; and home work, the study of a text book, and examinations are required.

One evening each week

512. Appreciation of Literature—1 Year

This subject is offered for those who wish to enlarge their cultural background and to study the principles of literary appreciation and criticism. Altho there will be emphasis upon literary technique, the constant aim will be to keep this subordinate to the spirit and the message of the selection.

The prose and the poetry studied will be treated analytically, with directed investigation of the various literary appeals—the intellectual, the sensory, the emotional, the aesthetic, the imaginative, and the philosophical. Emphasis will also be placed upon the value of an extensive reading program. (This course will not be given if the registration is less than twenty-five.)

One evening each week.

TEXTILE ENGINEERING DEPARTMENT

This department has arranged to offer those courses of study which lie at the foundation of all engineering. These are designed to give to those engaged in the mechanical, electrical, and manufacturing departments of mills, factories and other industrial establishments an opportunity to learn something concerning the theory underlying the many practical methods which they use in their daily work. Those subjects for which there is usually a regular demand are listed and described below, but similar and allied courses will also be arranged for provided there is a sufficient demand. In the case of all courses there must be an enrollment of at least ten properly qualified students to warrant giving the subject.

613. Mechanical Drawing—3 Years

This course is a complete course in drawing and is offered for one having occasion to make a sketch or detail drawing for the purposes of illustration or instruction, or for one who is daily required to work from a drawing or blueprint. It first lays a foundation of the principles of mechanical drawing, and follows this with two years' work in drawing directly from parts of machines, preparing both the detail and the assembly drawing.

The work is so planned that at its completion a man shall be thoroughly familiar with the making of a working or shop drawing. After a study of the underlying principles of projections and instruction in penciling, inking, lettering and tracing, the subject of sketching and the making of detail drawings therefrom is especially stressed. The preparation of assembly drawings is finally considered.

Two evenings per week.

614. Machine Shop Practice—2 Years

This course offers an opportunity to learn the art of metal working and is equally valuable to the man who already has some knowledge of the methods employed as

to one who has no knowledge of the same. Thus it becomes possible for one who may be working at the bench during the day to learn how to operate a lathe or other machine tool, or for a lathe hand to acquire a knowledge of a planer, shaper, milling machine, or grinder. A series of lectures is given on the care and management of tools, tool grinding, and the mechanism of the machines. A man who only has a knowledge of the special machine he operates may by means of this course become a more intelligent machinist. He should supplement this study with the courses in Mechanical Drawing, Shop Mathematics, Mechanics, and Mechanism, in order that his training for an all-round machinist or mechanic may be more complete.

Two evenings each week.

619. Mechanics—1 Year

This is one of the most important of engineering subjects. Its principles are so fundamental and so widely used in more advanced subjects that the student should not consider himself qualified for further work until he has mastered the principles of this subject.

Beginning with a discussion of such important topics as work, power, horsepower, energy and the like, the student then studies the fundamental mechanical principles which are exemplified by the lever, jackscrow, pulley block, inclined plane, wedge, differential pulley and other similar devices. This is followed by consideration of the simpler relations pertaining to uniform and accelerated motion. No student should undertake this course who is not thoroughly familiar with elementary mathematics. This subject requires home problem work and the study of a text book.

Two evenings each week.

620. Mathematics—2 Years

This course is designed to permit the student to pursue further the mathematics of his grammar or junior high school course, and should be taken by all who intend to study further into engineering subjects. The first year work in algebra includes addition, subtraction, multiplication, division, factoring and fractions. Some of the topics treated during the second year are graphical representation, linear equations, radicals, quadratic equations, logarithms, slide rule and trigonometry. Instruction is largely through problem work in class and at home and requires the use of a text book.

Two evenings each week.

621. Strength of Materials—1 Year

This interesting subject deals with those important principles whereby the person engaged in machine, engine, mill or building design may ascertain whether the parts are strong enough to carry the forces and loads which the nature of the construction imposes upon them.

The fundamental stresses of tension, compression and shear are first considered, together with the ultimate strength of cast iron, wrought iron, steel, and timber. The practical use of this information is illustrated in the design of bolts, tie rods, columns, wall piers, boiler shells, riveted joints, etc. This is followed by a study of the stresses in and design of beams under various conditions of loading, and the course concludes with a discussion of the torsional stresses and twist in shafts. A knowledge of the principles of Mechanics and Mechanism is highly desirable to a satisfactory understanding of this subject. The method of instruction is through lectures, recitations, problems, and the use of a text book.

Two evenings each week.

622. Steam—1 Year

It is the purpose of this course to study the various methods of heat generation, transmission, and utilization in use at the present day and to learn the theoretical relationship which underlie these processes and transformations.

The instruction covers, so far as time permits, the elements of steam engineering. The topics covered are heat and its measurement, use of steam tables, types of boilers, engines and turbines, boiler and engine room accessories, together with a study of the methods of testing the various types of apparatus. Actual tests on such equipment are made as the size of the class permits. Text books, laboratory and class work, and home problems are the methods of instruction used.

Two evenings each week.

625. Power Plant Machinery—1 Year

The purpose of this course is to teach the operating engineer how to test the various units usually found in a power plant. Numerical calculations are introduced and the interpretation of the results is of primary importance.

The following are some of the machines tested: engine, turbine, triplex pump, centrifugal pump, injector, etc. Various gages are also calibrated. A text book is required.

Two evenings each week.

626. Mill Illumination—1 Year

Safety and production, factors entering into the design of lighting installations, industrial codes, costs and estimates are carefully considered. The laboratory exercises include the study of photometric curves of industrial units, study and use of the photometer, study of illumination by means of the Macbeth Illuminometer, and foot-candle meter.

The concluding work will be the complete design of a lighting installation, using the Institute laboratories or a local mill room.

Owing to limitations in apparatus, this course is open to a limited number of qualified men.

Two evenings each week.

628. Selling and Advertising—1 Year. (Will not be given in 1944)

This course covers the basic principles of both salesmanship and advertising. Problems on the construction of individual advertisements, selling talks, and the planning of advertising campaigns, give the student an opportunity to put into practice the principles covered in the lectures.

The psychology of selling and advertising, copy writing, layout, printing and engraving, illustrations, testing of advertising, advertising campaigns, building a selling talk, retail salesmanship, and showmanship are some of the topics treated.

Two evenings each week.

630. Mechanism—1 Year

This course deals with those principles and elementary mechanism which are used in the transmission of motion through machines and mechanical devices. It requires a knowledge of the principles developed in "mechanics" and hence can be taken only by qualified students. The instruction includes pulleys, belting, gears, gearing, cams and similar topics. Home problem work and the study of a text book are required.

Two evenings each week.

631. Plane Geometry—2 Years

In this course the usual theorems and constructions of good text-books are studied. The topics include the properties of plane rectilinear figures, the circle and measurement of angles, similar polygons, areas, regular polygons and the measurement of the circle. Solutions of original exercises and applications of geometry in calculation of angles, areas, and lines will also be given. Assignments for home study will be made.

Two evenings each week.

632. Diesel Engines—1 Year (Will not be given in 1944)

The object of this course is to present an elementary study of Diesel engines, their operation, and maintenance. The subjects studied include—the various forms of Diesel engines in general, two and four cycle, semi-Diesel, etc.; a comparison between gasoline and oil engines; fuel oils—heat value, properties; fuel injection systems—control, timing, distribution; combustion—efficiency, control, products; engine parts and their functions—assembly, clearances, wear; lubricating oils—properties, filtration; cooling systems—heat transfer, radiation; air intake and exhaust systems—supercharging, silencing, heat recovery; starting systems—air, electric, gasoline; engine installations—vibration; engine applications—mobile, stationary; and maintenance in general for an entire power plant.

No student should undertake this course who is not familiar with elementary physics and mathematics, as considerable time will be spent on the materials used and the reactions involved in an internal combustion engine. The subject requires home problem work, study of a text book, and examination at the end of each term.

Two evenings each week.

633. Shop Mathematics—1 Year

This subject deals with the practical application of mathematics which is of the greatest use to machinists or those in similar lines of work. It consists of those parts of arithmetic, algebra, geometry and trigonometry, which are essential in modern machine shop practice. Some of the topics are:—fractions and decimals, logarithms, problems in ratio and proportion, areas of surfaces, calculation of angles, solution of right and oblique triangles.

In addition to the mathematical work, the scientific principles which govern the operation of various machines are studied. In this connection the following topics are included:—verniers and micrometers, levers, belt and gear speeds, screw threads and screw cutting, gear tooth computations, plain and differential indexing. This subject requires home problem work and the study of a textbook.

Two evenings each week.

634. Air Conditioning—2 Years (Will not be given in 1944)

The subjects covered in this course include the following; fundamental laws, principles and definitions; physical properties of the atmosphere; explanation of words and terms used, such as—matter, energy, heat, heat energy, temperature, ice, water, vapor, gas, steam, thermometers, hygrometers, hydrometers, barometers, pressure, gage pressure, absolute pressure, absolute temperature, laws of gases, heat units, vapor pressure, dew point, evaporation, condensation, precipitation, relative and absolute humidity; sensible heat, latent heat, specific heat, total heat of air, effective temperature, comfort zones, air movement, ventilation; movement of heat and air, infiltration, conduction, solar heat, air leakage; heat from human beings; lights, machinery and processes; humidification and dehumidification, heating and cooling, air filtration, air washing; refrigeration and refrigerants, cooling by water, ice, typical air-conditioning equipment, typical control equipment, thermostats, humidostats, wet and dry bulb type; use of charts and tables, costs, etc.

Students are required to hand in complete details for producing prescribed conditions of temperature and humidity in some building in or near Lowell, Mass., before completing the course.

One evening each week.

635. Practical Electricity—1 Year (Will not be given in 1944)

The purpose of this course is to aid students who wish to advance themselves in any one of the electrical trades. The course will cover the underlying facts and laws of good electrical practice which the really well-informed and efficient workman must understand.

Lectures will be given one night each week on the following subjects: the nature of magnetism, Ohm's Law, simple electric circuits, combinations of series and parallel systems, wiring diagrams, electric bulbs and telephones. The practical part of the course, given one night each week, is divided into several experiments which will give the student a working knowledge of electrical wiring and installations.

Two evenings each week.

636. Elements of Electricity—2 Years

This course is planned to cover the fundamentals of electrical circuits and machinery. The lectures on electrical theory are supplemented by laboratory work, the use of a textbook, and the solution of problems. A considerable amount of home study and preparation are required. Students who wish to take this course must have studied one year of algebra.

The first year is devoted to the study of direct and alternating current circuits. The topics include Ohm's law, calculation and measurement of resistance, power, relation between electrical and other units of energy, magnetic fields, inductance, capacitance, and impedance of alternating current circuits.

The second year takes up the design and operation of direct and alternating current machinery. Part of the time is devoted to laboratory work to make the student familiar with methods of operating and testing electrical machinery.

Two evenings each week.

637. Trigonometry and Navigation—1 Year

The purpose of this subject is to aid anyone about to join the armed services in understanding problems of navigation. It is also designed for those who have a

general interest in navigation. The subject includes use of tables, solution of plane triangles, navigational instruments, piloting, great circle sailings, the sextant, time, latitude observations, lines of position, and Ageton method of solving the astronomical triangle.

Two evenings each week.

638. Blue Print Reading—1 Year

This course is offered to those who wish only to be able to read drawings. While a fundamental knowledge of orthographic projection is desirable, it is not required. The course covers methods of projection, sections, dimensioning, and standard drawing practice. Blue prints of actual commercial drawings are used.

One evening each week.

Accounting Classes (Division of University Extension)

Classes in Elementary and Advanced Accounting have been offered in past years at the Lowell Evening Textile School under the auspices of the Division of University Extension, 200 Newbury Street, Boston, Mass. Their continuance is dependent upon a sufficient expression of interest in them. Outlines of the courses, fees, etc., may be obtained by inquiry at the above address or by addressing the school.

FINISHING DEPARTMENT

In this course machine work is supplemented by lectures and discussions pertaining to the many finishes given to fabrics. The action of soaps, water, steam, heat and cold upon cloth containing one fiber or combination of fibers as used in commercial fabrics is carefully studied. This course also helps the finisher to broaden his knowledge of textile fabrics.

710. Woolen and Worsted Finishing—1 Year

The outline of this course, which is given chiefly by means of lecture work, is as follows:

BURLING AND MENDING.—Under this head are taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are also considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the various types of stocks and their modifications and development into the present type of rotary fulling mills of both single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, method of covering, regulation and means of adjusting the pressure of traps and rolls, and the use and regulation of the various types of stopmotion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hygroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the production of various degrees of felt, as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The manipulation of the various kinds of goods in the mill, viz., all wool, reworked wools and mixed goods, is studied in classroom and by operation in the laboratory.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and sours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING AND STEAMING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In the manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year.

Two evenings each week.

EVENING GRADUATES OF 1944.

Certificates awarded as follows, April 4, 1944:

Woolen Yarns — One Year

Aylvard William Corcoran, Methuen
Melvin William Donnellan, Lowell
Ralph Seth Giffin, Jr., Lowell

Lennart William Leedberg, N. Chelmsford
Earl Herman Strauch, Methuen

Wool and Top Making — One Year

Sam Edwin Furness, Methuen
Clarice Annie Hope, Methuen

Dorothea Rebecca Looney, Lawrence

Worsted Yarns — One Year

Rita Frances Casby, Lawrence

Frank Nyder, Graniteville

Woolen and Worsted Weaving — One Year

William Edward Fluet, Methuen
Rocco Mambro, Lawrence

Lawson Reeves, Lowell

Woolen and Worsted Finishing — One Year

Arthur Dennison, Andover
Matthew Adam Novak, Lawrence

Edward Everett Schroeder, Lawrence

Decorative Art — Three Years

Mary Abodeely, Lowell

Textile Chemistry and Dyeing — Three Years

Charles Henry Redman, Lowell

Elementary Chemistry — Two Years

Katherine Cecilia Coyle, Lawrence
Joseph Augustine Hicks, Lawrence
Walter Whidder Fletcher, Westford
Raymond Joseph LaBelle, Lowell
Alain Augustin Legendre, Lawrence

Genevieve Rita McDonough, Lawrence
Howard Jackson Richardson, Methuen
Norman Albert Trumbull, Lawrence
Doris Blake Uttley, Methuen

Mechanical Drawing — Three Years

George John Hondras, Lowell
John Joseph Kiernan, Lawrence

Francis James Smith, Lowell

Blue Print Reading — One Year

Doris Thilda Bedell, Lowell
Marie Edna Irene Dufresne, Lowell
John Francis Jasinski, Lowell

Bessie Zouvelos, Lowell
Ferdinand Michael Zygadlo, Lowell

Mathematics — Two Years

Harold Albert Arnold, Methuen
Herbert Cornelius Faber, Lowell
Philip O. Desmarais, Jr., Lowell
Soteria J. Kosartes, Lowell

Katherine Rose Panagopoulos, Lowell
Robert Paul Phaneuf, Lowell
Dorothy Winifred Tulley, Lowell

Machine Shop Practice — Two Years

Gerard Eugene Grandchamp, Lowell

Trigonometry and Navigation — One Year

Noel Albert Pion, Lowell

Arthur Newton Tingley, N. Chelmsford

BULLETIN

of the

Lowell Textile Institute

LOWELL, MASS.

Issued Quarterly

1944

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under Act of Congress of July 16, 1894

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Act of October 3, 1917, authorized October 21, 1918

Moody Street and Colonial Avenue

OPPORTUNITY IN TEXTILE EDUCATION

AT

LOWELL TEXTILE INSTITUTE

Textile manufacture is one of the few industries sufficiently large to warrant the establishment of schools specializing in studies preparing directly for its needs. While early efforts of such schools were more or less vocational in approach, progressive schools gradually increased the technical and scientific content of their courses until they were on a plane with the recognized schools for mechanical, electrical, civil, chemical and industrial engineering.

In the forefront of this march of progress the Lowell Textile Institute now in its forty-eighth year has been granting degrees in Textile Chemistry and Textile Engineering for the past thirty-two years. Since 1935 it has been granting the degree of Master of Science in Textile Chemistry and in Textile Engineering.

For veterans wishing to prepare for some position in the Textile Industry, the Institute offers four types of opportunity.

First: — The regular undergraduate courses as carried on for many years give a well rounded range of subjects treating of processing from raw materials to the finished product. As the Textile field is much too large to be covered in all of its details in four years, students select those options which suit their talents and needs.

There are three-year courses for which diplomas are awarded designated as,

- I Cotton Manufacturing
- II Wool Manufacturing
- III Textile Design

There are also four-year courses leading to the degree of Bachelor of Textile Chemistry or Bachelor of Textile Engineering which are more frequently selected than the three-year courses. These are called:

- IV Chemistry and Textile Coloring
- VI Textile Engineering

Under these two titles several options are offered making it possible for students to major in certain phases of textile work if they wish. Students having college or technical school credits may be accepted for advanced standing. Students interested in these courses should consult the February 1944 Bulletin.

Second: — Graduates from accredited textile courses or graduates from technical schools or colleges may do graduate work leading to the degree of Master of Science. The time required for this work is one or two years depending upon the credits in textiles from undergraduate work. The subjects given in this classification vary with the interests of the student and are arranged in conference with the professor who directs the student. The February 1944 Bulletin should be consulted.

Third: — For graduates of recognized Textile courses who feel that they have lost contact with the details of the industry while in the service, there are plans for special "refresher" courses. Establishment of these courses is dependent upon having sufficient number of qualified applicants. A survey is being conducted to determine the best arrangement of time and content for these courses. It is expected that there will be intensive reviews of courses on textile subjects which will refresh the student on past work and add any new developments of recent origin.

It is not intended that any academic credit will be given for refresher courses, although some recognition may be issued if it seems advisable.

These courses are outlined as follows:

COTTON YARNS AND FABRICS

The courses under this heading are intended for students planning to go into Cotton Manufacturing or allied work. The subject matter available includes Carding, Spinning, Designing, Weaving, Dyeing, Finishing, Testing and Organization as applied to Cotton Manufacturing. Processing of various staple fibers on the Cotton System may be added if desired.

TEXTILE ENGINEERING DEPARTMENT

While all students who seek some engineering training are advised to pursue some one of the broad four-year courses because these lay a more comprehensive foundation for future engineering or industrial work, yet it may be the desire of some to review particular subjects which are a part of these courses which are given by the staff of this department. For information and suggestion the following list is given:

Air Conditioning	Machine Shop Practice
College Mathematics	Mechanical Drawing
Descriptive Geometry	Perspective Drawing
Electronics	Physics
Elements of Electrical Engineering	Statistical Control of Quality
Elements of Heat Engineering	Strength of Materials
Graphic Statics	Textile Testing
	Textile Microscopy

It is strongly recommended, however, that the student should broaden his training by taking such combinations of these subjects as are best suited to the objective for which he is training. Some suggested combinations are offered in the following list:—

College Mathematics and Physics
 Electricity and Electronics
 Graphics and Strength of Materials
 Mechanical Drawing and Machine Shop Practice
 Mechanical Drawing and Perspective Drawing
 Mechanical Drawing and Descriptive Geometry
 Textile Testing, Microscopy and Statistical Control of Quality

It is a source of general satisfaction to all who are interested in the Institute and the place it occupies in the systems of education of this country to learn that it has, during the past two years, made a real contribution to the training of personnel for more effective action in war service. As the great body of alumni entered the many branches of war service they soon discovered that the basic training which they had as undergraduates was valuable in acquiring the technique of warfare. The same courses of physics and mathematics that were deemed essential as a foundation for Engineering Chemistry and Manufacturing training were found to be required preparation for officer training schools and to commissions in many of the branches of the service. In some subjects particular direction was given in classes to their application to service problems, thus improving the efficiency of the individual.

Besides this contribution made through the regular course subjects there were organized six special training programs to meet the immediate needs of technical workers. These were carried on under the provisions of the Federal Department of Education and are known as the Engineering, Science, Management War Training Courses. Nearly 200 students benefited from this program. The several branches covered were Fundamentals of Radio, Part One and Two, Textile Testing, Advanced Engineering Drawing, Elements of Electricity. The content and set-up of the courses in Fundamentals of Radio attracted the attention of certain officials of the Polaroid Corporation that was producing apparatus for the United States Navy. The operation of this apparatus required a fundamental knowledge of elementary electricity and electronics as used in radio. These officials sought the cooperation of the Institute in organizing class and laboratory work to train Navy personnel in the basic principles underlying the operation of this equipment. The program which was set up did train some twenty-three groups of thirty Navy men each.

On the occasion when the last group finished its course of training appropriate exercises were held with a banquet and dancing. At that time Lieut. S. D. Connell, U.S.N.R., addressed the group and their friends, representatives of the Trustees and Faculty of the Institute, stating in part as follows:

"About a year ago the Polaroid Corporation found itself in a rather difficult position, faced with the necessity of providing training of a highly technical

KNITTING: — The basic work in knitting consists of a general survey of the entire field of knitting which will serve as a broad background for any particular branch of the industry.

WOOLEN AND WORSTED YARN DEPARTMENT

WOOLEN YARN MANUFACTURING: — Including Reworked Wool Production, Blending and Oiling, Picking, Carding and Spinning by mule and frame.

TOP MAKING: — Including Grading, Sorting, Scouring, Carding and Combing.

WORSTED YARN MANUFACTURING: — Including Drawing, Spinning and Twisting French and Bradford Systems.

DESIGN AND WEAVING DEPARTMENT

The following subjects are available in this department for concentrated effort or as subjects selected by the individual along with subjects in other departments to fulfill his particular needs.

Cotton Design & Analysis	Sketching
Woolen & Worsted Design and Analysis	Principles of Decorative Design
Cotton Weaving	Color and Color Trends
Woolen & Worsted Weaving	Jacquard Design and Card Cutting
Perspective	Decorative Surface Pattern
	Loom Fixing

CHEMISTRY & TEXTILE COLORING DEPARTMENT

This department offers the following courses for students who either have had no previous training in chemistry or wish to review the subject.

1. Inorganic Chemistry
2. Elementary Organic Chemistry
3. Qualitative Analysis

The above courses may be completed in one school year and students whose work is satisfactory are eligible for the following courses:

4. Textile Chemistry and Dyeing
5. Analytical Chemistry
6. Textile and Analytical Chemistry

Applicants who have had training equivalent to the elementary courses may upon presenting proper credentials or upon passing an examination in those subjects, enter the advanced classes in Textile and Analytical Chemistry.

The course in Textile Chemistry and Dyeing is designed for students who are interested in securing employment in the dyeing, bleaching and finishing departments of textile mills, and for those interested in demonstrating or selling dyestuffs and other chemicals to the textile trade.

The course in Analytical Chemistry is designed for students interested in securing employment in testing and control laboratories of textile mills or in laboratories of concerns not engaged in the textile trade. This course is also of interest to those who intend to sell heavy and fine chemicals.

The combined Textile and Analytical course gives a broader training for students primarily interested in textile than either course 4 or course 5.

If time and schedules permit students electing courses 4 and 6 would find elementary courses in design, cotton and wool manufacturing of value in supplementing their work in the Chemistry Department. Courses in mathematics and physics are recommended to those electing course 5.

KNITTING

This general survey of Knitting covers the fields of flat knitting, hosiery, and underwear manufacture, warp knitting, designing and testing. This work may be taken in conjunction with certain courses in cotton, woolen and worsted yarn manufacture to give a reasonably complete fibre to fabric course.

WOOLEN AND WORSTED YARNS AND FABRICS (Majoring in Yarn Manufacturing)

This course while devoting the large part of the time to yarn manufacture does include classroom and laboratory instruction in Woolen and Worsted Design, Weaving and Finishing of this type of fabrics, Textile Chemistry and Dyeing and Textile Testing. It is planned to complete this course in one year and is intended for those who intend to enter the production branch of the industry.

FABRIC MANUFACTURING (Majoring in Design and Weaving)

(a) Cotton Fabrics. — This course is to consist of the following subjects to be given by classroom and laboratory instruction: Textile Design and Analysis, Yarn Manufacturing, Color and Color Trends, Weaving, Textile Chemistry and Dyeing, Finishing of Cotton Fabrics and Textile Testing. This is to be a one-year course for those planning to enter the production branch of the industry.

(b) Woolen and Worsted Fabrics. — This course is intended to include the following subjects to be given by classroom and laboratory instruction: — Textile Design and Analysis of Woolen and Worsted Fabrics, Yarn Manufacture, Color and Color Trends, Weaving, Textile Chemistry and Dyeing, Finishing of Woolen and Worsted Fabrics and Textile Testing. This course is to be covered in one year and is intended for those who wish to enter this branch of the industry.

(c) General Design and Weaving. — For those who wish a general course to include a wider consideration of standard fabrics made from blends of natural and synthetic fibres and yarns the following subjects have been selected: Design and Analysis of Fabrics, Jacquard Designing and Card Cutting, Weaving, Principles of Decorative Design, Color and Color Trends, Finishing, Textile Chemistry and Textile Testing. This course can best be covered over a two-year period and is intended for those who wish to develop their natural ability in Decorative Design with special application to textile fabrics.

(d) Textile Styling. — For those who are interested in the design, creation and distribution of textile fabrics and their utilization the following comprehensive course is offered: Design and Analysis of Fabrics for Wearing Apparel, Jacquard Design and Card Cutting, Weaving, Principles of Decorative Design, Color and Color Trends, Decorative Surface Patterns (including origin, influence, promotion and cycles), Perspective and Sketching, Textile Chemistry and Dyeing, Finishing and Textile Testing. This should require fully two years and is intended to help those who seek positions in the selling marts of the country.

Fourth. — As far as facilities permit and providing there is a sufficient number of applicants to form a class, the Institute may offer courses for veterans who wish to specialize in some phase of textile work. To meet such possible needs the several departments can provide courses as listed below.

COTTON DEPARTMENT

While some of these courses may be taken separately it is suggested that a much broader foundation will be obtained if they are taken in combination with courses in Design, Weaving and Finishing.

COTTON CARDING: — This course covers the regular system of cotton manufacturing up to Spinning; including Cottons, Classing, Opening, Picking, Carding, Combing, Drawing and Roving.

COTTON SPINNING: — Following the work in carding this course includes a study of Spinning, Winding and Twisting.

COTTON ORGANIZATION: — This work involves a study of the usual organizations commonly used, the changes in process of development, the calculation of machines for balanced production and the arrangement for economical processing.

nature for personnel of the Navy. Anyone who has been confronted with this particular problem in the present war knows that the discovery of technical training facilities not already 100% absorbed by war effort is a formidable task. The difficulty, of course, was even more the Navy's than it was Polaroid's. For it was conceivable that a commercial company could under certain circumstances, fail to meet a contractual obligation such as the provision of this training, while the Navy could under no circumstances afford to fail to supply properly trained personnel to man the high important training equipment concerned.

"For the above reasons, and after a period of considerable discouragement, it is no exaggeration to state that President Eames' visit to the Polaroid Corporation about a year ago was a genuine ray of sunshine. During that visit President Eames, in talking with Professor Rule of the Polaroid and myself, voiced the opinion that perhaps the Lowell Textile Institute could provide exactly the training for which we were searching. I must state frankly that Professor Rule and I were a little skeptical after this visit, but I think our skepticism was a natural reaction after the number of disappointments that we had encountered. However, the enthusiasm and effectiveness with which Professor Wells and his staff of the Institute took over our problem soon dispelled any such doubts.

"I know that the Lowell Textile Institute takes great pride in its accomplishments on our behalf over the past year. I can only state that if this pride is commensurate with our gratification and with our appreciation of a job well done, then the Institute is indeed very proud.

"It is a pleasure to express the gratitude of the Navy to President Eames and the Board of Trustees of the Institute for their unfailing cooperation and for getting us started on the right foot; to the staff of the Institute for the uniform excellence of its instruction and for its continuing devotion to the task at hand; and especially to Professor Wells who, after all, has had the toughest job and has done the most work. I can best summarize Professor Wells' contribution by saying that he has given the Navy program everything he has, and that that is a very great deal indeed."

During the present summer in response to requests the Engineering, Science Management War Training program has been again organized with the establishment of courses in Fundamentals of Radio, both Part I and Part II, Textile Testing, Industrial Electronics I, Textile Engineering and Elementary Microscopy. These are aids in the up-grading of employees in mills of this locality where war work is in need of such assistance. Besides this program members of the staff are cooperating in a similar program directed by the University of New Hampshire for classes in Textile Engineering at Greenville and Textile Chemistry at Nashua.

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Moody Street and Colonial Avenue

LOAD-ELONGATION RECORDER FOR YARNS

By Harry C. Brown, S.B., Assistant Professor of Physics

Introduction

The relation between load and elongation is an important physical characteristic of textile fibers and yarns. It may be used to determine modulus of elasticity, properties of recovery and permanent set, breaking strength, elongation at break, crimp of fibers, and crimp of yarns after removal from woven fabrics. Several years ago, the writer constructed a device by which a load was put upon a yarn by the chainomatic principle and the corresponding elongation was read from a scale and vernier. Very accurate measurements of load and elongation can be obtained from it and the apparatus is still being used in crimp determinations, but the time and effort required to obtain a set of readings and to plot the results are prohibitive for commercial practice. The apparatus described in this paper is a development of the preceding device, and plots automatically in a few seconds a load-elongation curve which would have required at least one-half hour by the former method.

Description of Apparatus

A schematic diagram of the load-elongation recorder is shown in Figure 1. The test specimen of yarn or fiber is held in a vertical position by two jaws, A and B, which are separated by an initial distance of 10" for yarns and by a shorter distance for fibers. A constant rate of elongation of the specimen is produced by moving the upper jaw in an upward direction at a speed of 0.65 inch per minute. The motion is produced by a small motor M_1 with enclosed reduction gear and a rack and pinion drive. Motor M_1 also turns a recording drum at a constant rate of speed which is proportional to the uniform upward speed of the upper jaw. Change gears at C between M_1 and the recording drum provide three different scales of elongation.

The lower jaw which grips the specimen is fastened to a balance arm to which is also attached the loading chain. When there is no load on the test specimen, the counterweight on the balance arm keeps it in a horizontal position. When the motion of the upper jaw produces tension in the yarn, the slight upward movement of the balance arm makes an electrical contact in the grid circuit of a thyratron tube causing motor M_2 to add an amount of chain to the arm equal to the tension in the yarn. If too much chain is added, an electrical contact on the lower side of the arm reverses the motor through a second thyratron; and in this manner, the balance of the arm is maintained for all loads.

Motor M_2 which applies the load to the balance arm also moves a recording pen in a direction parallel to the axis of the recording drum. The pen is moved by a small chain driven by a sprocket wheel on an extension of the shaft of motor M_2 . The motion of the pen combined with the rotation of the recording drum traces a load-elongation curve of the specimen.

The actual location of the various parts of the recorder and many of the details of construction not shown in the schematic diagram are shown in the photograph, Figure 2. The upper jaw A is attached to a vertical $\frac{1}{2}$ " steel rod which passes through guides in two steel plates, one at C and the other at D, both supported by a larger steel rod E. The rack and pinion which move the steel rod and upper jaw in a vertical direction are located below D, the rack being held in a slot cut in the rod. The lower jaw is attached to the balance arm at B. The balance arm is made of aluminum and is supported by a small steel pin in bearings on plate D. The electrical contactors on the right end of the balance arm are distributor points used on automobile engines.

The loading chain which is seen on the sprocket wheel at F is a stud chain weighing .086 pound per foot. A lighter No. 2 ladder chain of .044 pound per foot and a heavier non-roller chain of 0.20 pound per foot with corresponding sprocket wheels are used to give different loading capacities.

Two small motors are seen on the right. The motor (M_1) which moves the upper jaw and turns the recording drum is in front and slightly higher than the other motor (M_2) which drives the loading chain and moves the recording pen. A small

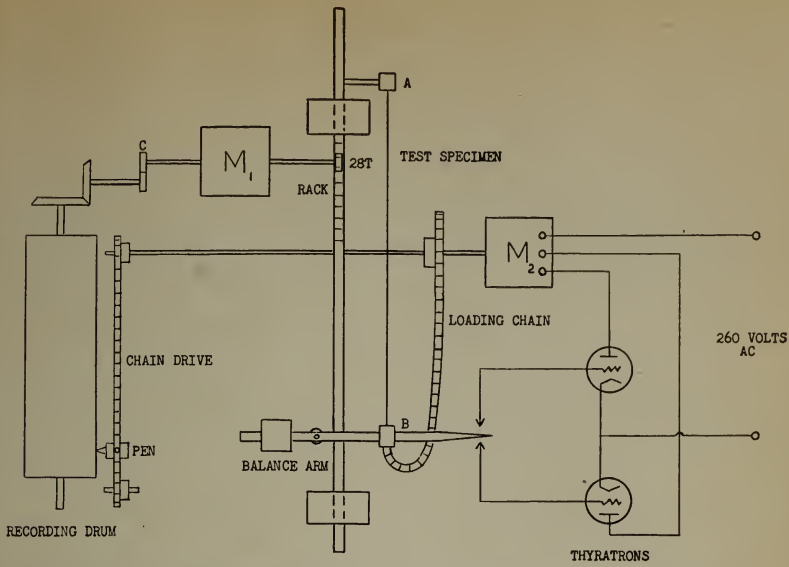


FIGURE 1. SCHEMATIC DIAGRAM OF LOAD-ELONGATION RECORDER

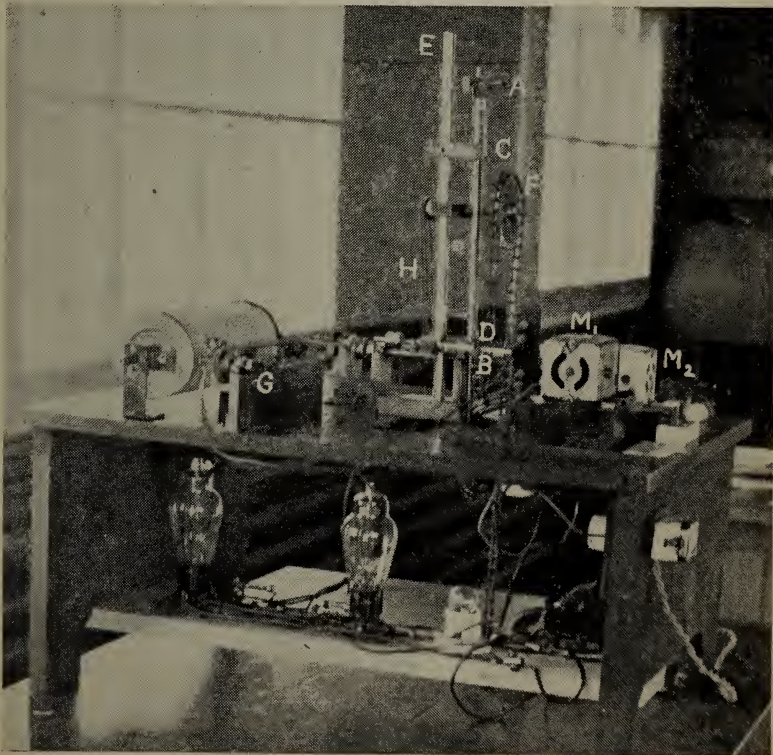


FIGURE 2. LOAD-ELONGATION RECORDER

chain drive at H (not shown in the schematic diagram) connects the shaft of M_2 with the shaft of the loading chain sprocket wheel.

The recording pen is mounted on a steel block which moves in a metal guide G as the loading chain is applied to the specimen. The recording drum is a wooden cylinder with steel end plates and holds a piece of plotting paper $8\frac{1}{2}'' \times 11''$ by means of spring clips. The projecting rim of one of the end plates serves as a guide when aligning the axes of the plotting paper. The shaft of the recording drum passes through hubs in the end plates. By loosening a setscrew in one of the hubs, the drum can be turned freely on the shaft when replacing the plotting paper and in making a zero setting of the pen.

The different parts of the apparatus are mounted on an elevated base $20'' \times 26''$, excepting the thyatron tubes and other electrical equipment which are seen in a lower position.

Electrical Circuits

Motor M_1 , which drives the upper jaw, is a 110 volt, shunt-wound, direct-current motor with built-in reduction gear giving a speed of 1 revolution per minute. It is started, reversed, and stopped by a reversing switch in the armature circuit (see Figure 3).

Motor M_2 is a 110 volt, series-wound, direct-current motor with reduction gear giving 2 revolutions per second. The circuit used for operating M_2 is also shown in Figure 3.

When a thyatron is used for controlling motor operation, an alternating-current source is essential because the thyatron is deionized at the reversal of the current and the grid regains control of the tube. It is found that the direct-current series motor M_2 in series with a thyatron FG-17 operates satisfactorily with one-half of the field winding on an alternating-current source of 60 cycles and 260 volts. A small radio transformer furnishes the motor current of 0.14 ampere. A resistor in the secondary circuit reduces the voltage from 350 to 260 volts.

As both alternating and direct current are available where the apparatus is used, the grid circuits of the thyatrons are energized by direct-current from a voltage divider. When the balance arm is in a horizontal position with both contacts open, a negative voltage of 20 volts is applied to the grids of both tubes and there is no flow of current. When tension in the test specimen causes the upper contactor on the balance arm to operate, the voltage on the grid of the corresponding thyatron is reduced to zero. The thyatron allows one-half of the alternating-current cycle

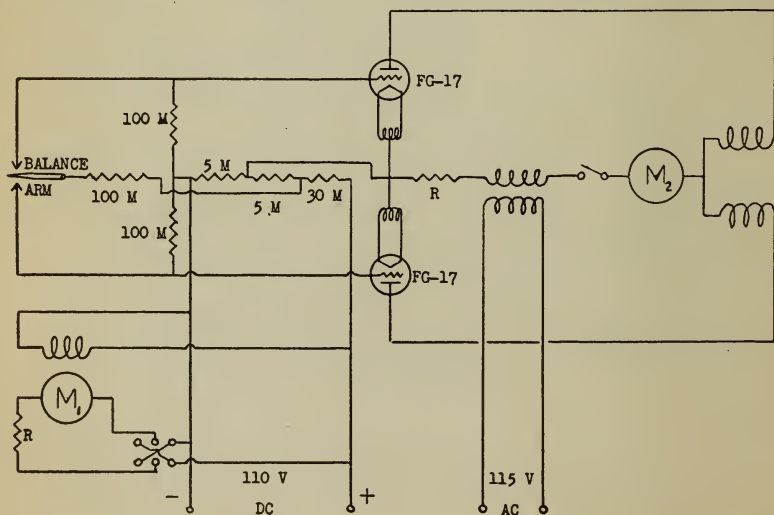


FIGURE 3. ELECTRICAL CIRCUITS OF RECORDER

to pass through it and motor M_2 operates with one-half of the field winding to increase the weight of chain on the balance arm. When the lower contactor on the balance arm closes its circuit, the other thyatron conducts current and motor M_2 runs in the opposite direction.

Discussion of Results

Load-elongation curves drawn by the recorder are shown in Figures 4 and 5. A, B and C are curves for three yarns of approximately the same diameter and length per pound but of different materials. The yarns used in obtaining A, B and C were a 35's cotton, a 150 denier rayon, and a 56's worsted, respectively. In both figures, curve C clearly shows the slipping of the fibers near the breaking point and the sudden decrease in load at the instant of breaking. D is a curve obtained from a cotton yarn which was removed from a woven fabric. The greater elongation of D compared with the others is due to crimp placed in the yarn during the weaving process. The actual amount of crimp in the test specimen can be found by producing the upper straight portion of the curve back to the horizontal elongation axis. The intersection on the axis gives the crimp in inches. The same kinds of yarn were used to obtain Figure 5, but the elongation scale is one-half that of Figure 4.

A slight waviness in some of the plotted curves is possibly due to friction in the loading chain links. The friction is negligible in ladder chains, but tight pins in roller and stud chains produce irregularities in the plotted curves. Some variations in the load-elongation curve are undoubtedly due to inherent characteristics of the specimen. The rayon yarn which contains a very uniform arrangement of filaments gives the smoothest and straightest curve of any of the specimens.

When curves such as B make a large angle of inclination with the horizontal axis, it is important to determine if the rate of elongation has been too high for the maximum rate of load application. In this case the upper balance arm contact remains closed indicating that the motor is unable to supply sufficient load to break the contact and hence the load-elongation diagram is incorrect. The maximum angle of inclination which can be plotted is obtained by holding the upper contact in a closed position while the drum is turning and allowing the pen to draw a straight line on the plotting paper. When this angle is approached with a test specimen, the rate of loading must be increased by using a heavier chain or the rate of elongation must be decreased.

Many calibrations of the elongation scale have shown it to be very accurate when the zero setting is correctly made. When the direction of the upper jaw is reversed in plotting loading and unloading curves, allowance must be made for a small amount of backlash in the gears driving the recording drum. The setscrew holding the recording drum on its shaft is loosened and the drum is turned on its shaft a known amount to compensate for the backlash.

The connection between the loading chain and recording pen is made by means of chains and sprocket wheels. Lost motion can be reduced by making the spaces between the teeth of the sprocket wheels slightly deeper.

On very light loads the accuracy of the recorded load is limited by friction in the balance-arm support and by the pressure necessary to close the balance arm contacts. However, the current passing through the contactors on the balance arm is extremely small, of the order of 160 microamperes, and very little pressure is necessary to complete the circuit.

From the preceding description of apparatus, it is evident that the results obtained with the recorder are for a constant rate of elongation. The pendulum type of tester which has been widely used in textile strength and elongation testing gives neither constant rate of elongation nor constant rate of loading. The tendency in textile testing in recent years has been in the direction of constant rate of loading and the inclined plane type of tester has been developed for this purpose. In metal testing the standard procedure has been to employ a constant rate of elongation for load-elongation measurements. With test specimens of similar characteristics and obeying Hooke's law, the results should be the same with either method. It was decided to employ a constant rate of elongation with the recorder because the motion of the loading chain on the sprocket wheel in testing an average specimen is

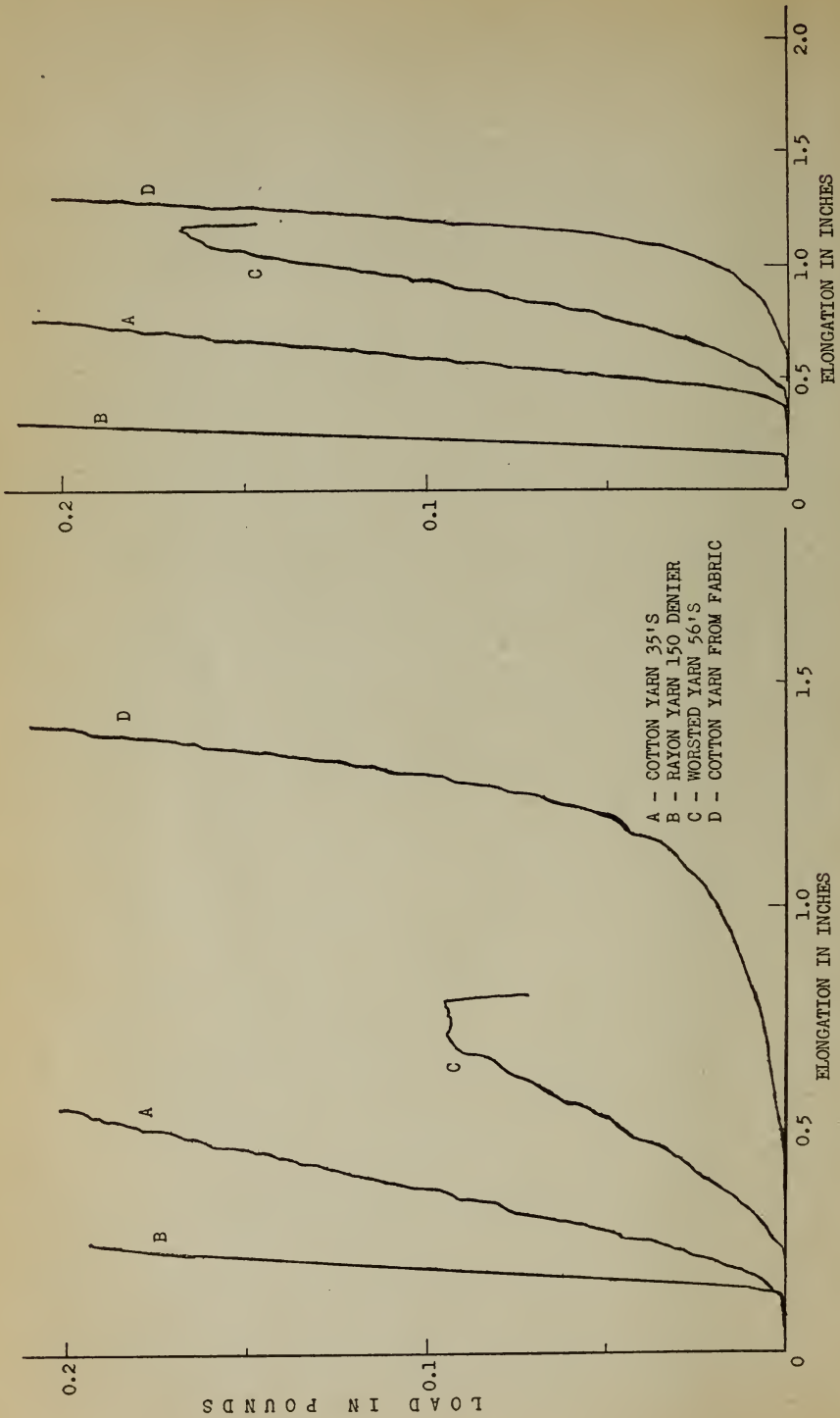


FIGURE 4

FIGURE 5

2 or 3 feet while the motion which produces the elongation is only 1 or 2 inches. It was felt that the larger motion of the loading chain could be automatically controlled more precisely than the smaller motion of the upper jaw.

Inertia in the loading mechanism of textile strength testers has proved to be an undesirable feature, especially in testing some of the new fibers having high elasticity and strength. Oscillations of the loading weights produce variations in stress in the test specimen and the total stress is not always correctly indicated or recorded by the tester. When the load is applied by utilizing the weight of a suspended chain, there is very little inertia at light loads. As the load increases, there is also an increase in inertia but vibrations are restrained by the electrical contactors above and below the end of the balance arm. There is a clearance of about .01 inch between one pair of contactors when the other pair is in a closed position and large variations in load caused by inertia are not transmitted to the test specimen but are absorbed by the contactors.

Improvements

Minor changes in the design of the apparatus are in progress to increase the loading capacity to one pound. An automatic reversing and stop motion is being added to reverse the direction of motion of the upper jaw and return it to its zero position.

In an earlier design of the apparatus the entire motor current passed through the balance arm contactors. Placing the contactors in the grid circuits of thyratrons greatly improved the sensitivity of the apparatus, and now it is intended to further increase the sensitivity by connecting two vacuum tubes in the grid circuits of the thyratrons and to connect the balance arm contactors in the grid circuits of the vacuum tubes.

There is no apparent reason why the capacity of the apparatus cannot be increased to 20 lbs. or more without using an excessive amount of chain for loading the balance arm. By using a compound lever (see Figure 6) to apply the load to the test specimen and by increasing the dimensions of parts of the apparatus, it would be possible to load nearly any yarn to the breaking point.

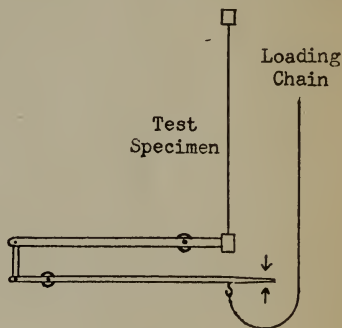
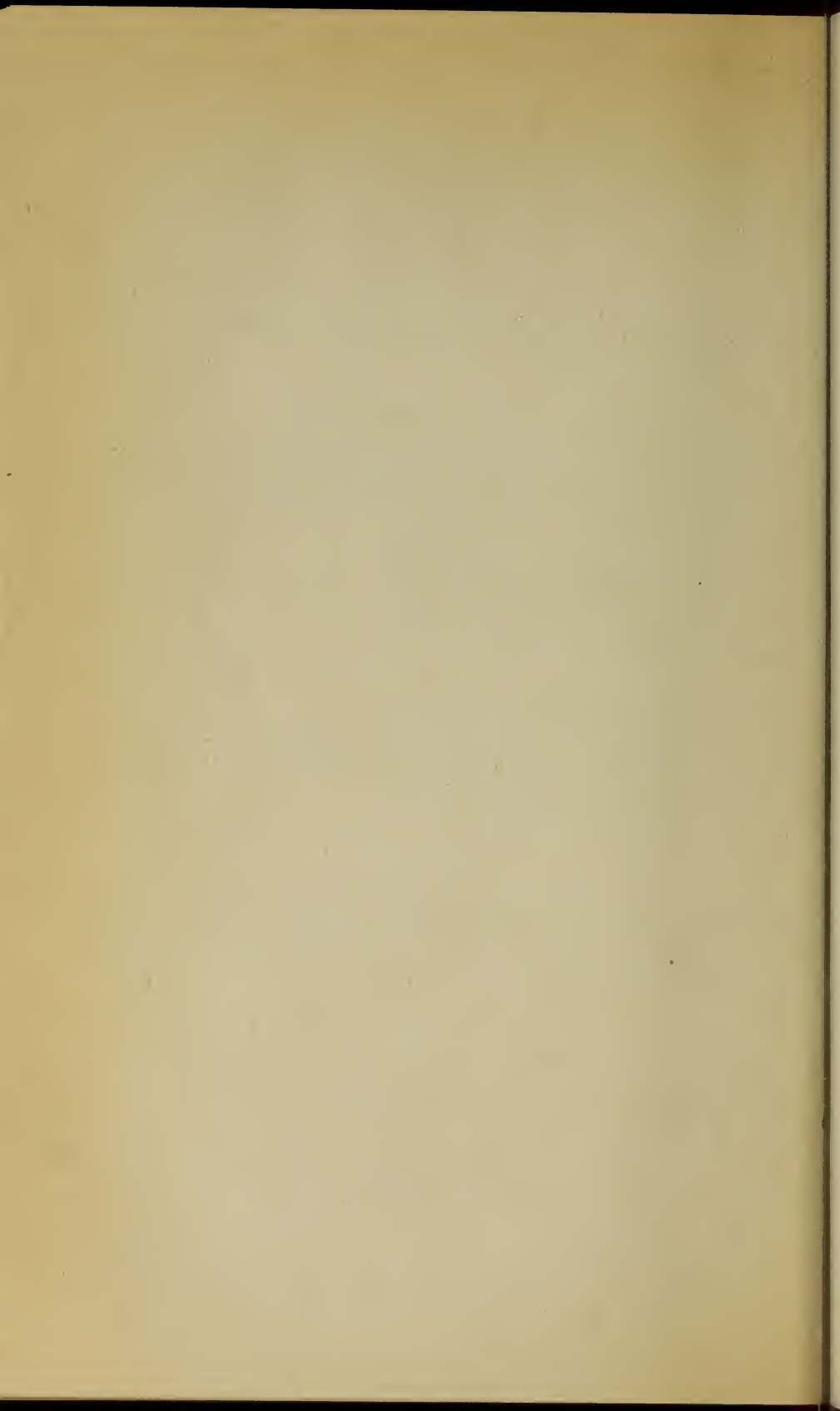
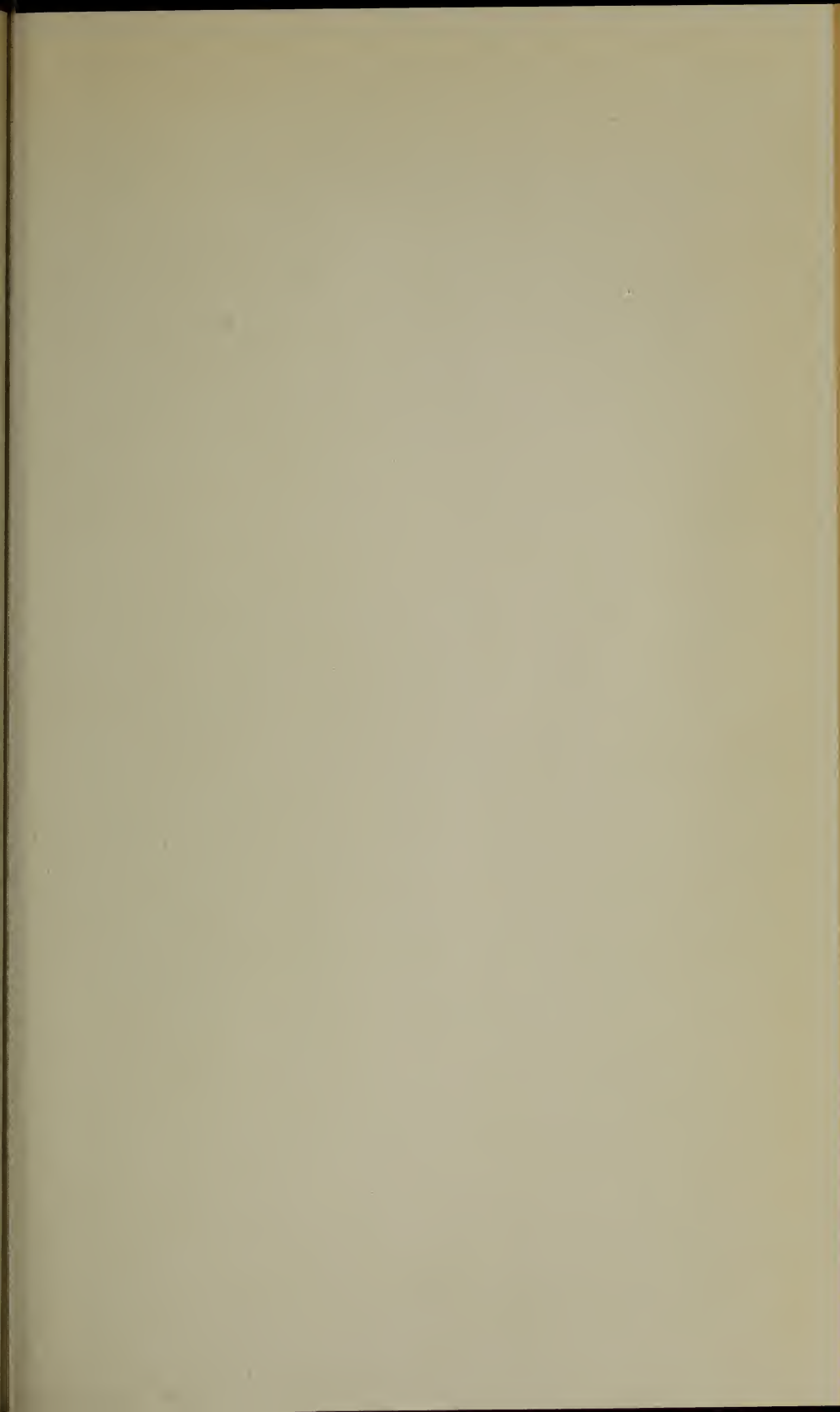


FIGURE 6

Conclusion

The author wishes to thank former undergraduate students Albert D. Eichner and Donald W. Guilfoyle for work done on the recorder. He is also greatly indebted to Professor Herbert J. Ball, head of the Textile Engineering Department, and to Mr. Paul D. Petterson of the same department for helpful suggestions and especially to the latter for much of the machine work.







Southwick Hall

Louis Pasteur Hall

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CALENDAR

1944-1945

September 12-13, Tuesday-Wednesday . . .	Entrance Examinations
September 11-15, Monday-Friday	Re-examinations
September 14, Thursday, 9:30 A.M.	Registration for Freshmen
September 18, Monday	Registration for upper-class students
	Classes begin for Freshmen
September 19, Tuesday	Classes begin for upper-class students
October 12, Thursday	Columbus Day — Holiday
November 11, Saturday	Armistice Day — Holiday
November 22, Wednesday, 4.00 P.M.	Thanksgiving recess begins
November 27, Monday, 8.50 A.M.	Thanksgiving recess ends
December 20, Wednesday, 12.25 P.M.	Christmas recess begins
January 3, Wednesday, 1.25 P.M.	Christmas recess ends
January 15, Monday	First term examinations begin
January 26, Friday	End of first term
January 29, Monday	Second term begins
February 22, Thursday	Washington's Birthday — Holiday
March 23, Friday, 4.00 P.M.	Spring recess begins
April 2, Monday, 8.50 A.M.	Spring recess ends
April 19, Thursday	Patriots' Day — Holiday
May 21, Monday	Second term examinations begin
May 30, Wednesday	Memorial Day — Holiday
June 5, Tuesday	Commencement
June 7-8, Thursday-Friday	Entrance Examinations

1945-1946

September 11-12, Tuesday-Wednesday . . .	Entrance Examinations
September 10-14, Monday-Friday	Re-examinations
September 13, Thursday, 9.30 A.M.	Registration for Freshmen
September 17, Monday	Registration for upper-class students
	Classes begin for Freshmen
September 18, Tuesday	Classes begin for upper-class students
October 12, Friday	Columbus Day — Holiday
November 12, Monday	Holiday — Observance of Armistice Day
November 21, Wednesday, 4.00 P.M.	Thanksgiving recess begins
November 26, Monday, 8.50 A.M.	Thanksgiving recess ends
December 19, Wednesday, 12.25 P.M.	Christmas recess begins
January 2, Wednesday, 1.25 P.M.	Christmas recess ends
January 14, Monday	First term examinations begin
January 25, Friday	End of first term
January 28, Monday	Second term begins
February 22, Friday	Washington's Birthday — Holiday
April 12, Friday, 4.00 P.M.	Spring recess begins
April 22, Monday, 8.50 A.M.	Spring recess ends
May 20, Monday	Second term examinations begin
May 30, Thursday	Memorial Day — Holiday
June 4, Tuesday	Commencement
June 6-7, Thursday-Friday	Entrance Examinations

TRUSTEES OF THE LOWELL TEXTILE INSTITUTE

Officers

HAROLD W. LEITCH, *Chairman*

ROLAND E. DERBY, *Vice-Chairman*

CHARLES H. EAMES, *Clerk*

Trustees

On the Part of the Commonwealth of Massachusetts

JULIUS E. WARREN, Commissioner of Education

On the Part of the City of Lowell

Hon. WOODBURY F. HOWARD, Mayor of Lowell

FOR TERM ENDING JUNE 30, 1945

RICHARD G. CHADWICK, Lowell, Engineer, New England Telephone & Telegraph Company

ROLAND E. DERBY, Lawrence, Proprietor, The Derby Company

HAROLD V. FARNSWORTH, Boston, Textile Engineer, Atkinson, Haserick & Company

STEPHEN R. GLEASON, Lowell, Superintendent, Walter L. Parker Bobbin & Spool Company

J. EMILE LEMIRE, Lowell, Teacher, Lowell High School

FOR TERM ENDING JUNE 30, 1946

HAROLD E. CLAYTON, Lowell, Treasurer and Manager, Clayton Hosiery Mills, Inc.

ALBERT J. GILET, Lowell, Vice-President, Gilet Carbonizing Company, Inc.

HAROLD T. GODFREY, North Andover, Director, Davis & Furber Machine Company

LOUIS G. HAYES, Boston, Union Color & Chemical Company, Boston

WALTER B. FRENCH, Lowell, Manager, Appleton Company

FOR TERM ENDING JUNE 30, 1947

FRANCIS P. MADDEN, Boston, Selling Agent, Cotton Goods, 38 Chauncy Street

HAROLD W. LEITCH, Lawrence, General Superintendent, Worsted Division, Pacific Mills

MYRON S. FREEMAN, Worcester, President, The Bell Company

MELVILLE WESTON, Lowell, Treasurer, Newmarket Manufacturing Company

JOHN H. GRIFFITH, Lowell, Courier-Citizen Company

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EDGAR HARRISON BARKER	9 Mount Hope Street
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LOUIS ATWELL OLNEY, S.B., M.S., Sc.D.	118 Riverside Street
Professor Emeritus of Chemistry	
HERMANN HENRY BACHMANN	146 Parkview Avenue
Professor Emeritus of Textile Design	
LESTER HOWARD CUSHING, A.B., Ed.M.	10 Walden Street
Professor of History and Economics; in charge of Department of Languages, History and Economics; Secretary of the Faculty; Director of Athletics and Physical Education	
HERBERT JAMES BALL, S.B., B.C.S., F.T.I.	34 Pentucket Avenue
Professor of Textile Engineering; in charge of Department of Textile Engineering and Accountancy	
GILBERT ROSCOE MERRILL, B.T.E.	364 Varnum Avenue
Professor of Textiles; in charge of Department of Cotton Yarns and Knitting	
CORNELIUS LEONARD GLEN	R.F.D. No. 1, Lowell
Professor of Textiles; in charge of Department of Finishing	
RUSSELL LEE BROWN, B.T.E., M.S.	59 Bradstreet Avenue
Professor of Textiles; in charge of Department of Wool Yarns	
ELMER EDWARD FICKETT, B.S.	162 Hovey Street
Professor of Chemistry; in charge of Department of Chemistry and Textile Coloring	
VITTORIA ROSATTO, B.S.	63 Bradstreet Avenue
Professor of Textile Design; in charge of Department of Design and Weaving	
STEWART MACKAY	North Chelmsford
Assistant Professor in Textile Design Department	
JOHN CHARLES LOWE, B.T.E., M.S.	229 Dracut Street
Assistant Professor in Wool Department	
MARTIN JOHN HOELLRICH	30 Saxonia Avenue, Lawrence
Assistant Professor in Weaving Department	
HAROLD CANNING CHAPIN, Ph.D.	290 Pine Street
Assistant Professor in Chemistry and Dyeing Department	
CHARLES LINCOLN HOWARTH, B.T.C.	North Billerica
Assistant Professor in Chemistry and Dyeing Department	
HARRY CHAMBERLAIN BROWN, S.B.	272 Merrimack Street
Assistant Professor in Textile Engineering Department	
JAMES GUTHRIE DOW, A.B.	11 Robbins Street
Assistant Professor in Language Department	
A. EDWIN WELLS, B.T.E., Ed.M.	37 Ashland Street, Melrose Highlands
Assistant Professor in Textile Engineering Department	
JAMES HARRINGTON KENNEDY, JR., B.T.E., M.S.	(On leave of absence)
Assistant Professor in Wool Department	
CHARLES FREDERICK EDLUND, B.S., Ed.M.	(On leave of absence)
Assistant Professor in Textile Engineering Department	
JOHN HENRY SKINKLE, S.B., M.S.	Chelmsford
Assistant Professor in Chemistry and Dyeing Department	
HORTON BROWN, B.S.	178 Atlantic Avenue, Marblehead
Assistant Professor in Textile Engineering Department	
WINFORD SYKES NOWELL, B.M.E.	8 Fulton Street, Methuen
Assistant Professor in Finishing Department	

NATHANIEL ERSKINE JONES	19 Maryland Avenue
Assistant Professor in Cotton Department	
CHARLES HARRISON JACK	68 Canton Street
Instructor in Textile Engineering Department	
RUTH FOOTE, A.B., S.B.	46 Victoria Street
Instructor and Registrar	
RUSSELL METCALF FOX	359 Beacon Street
Instructor in Textile Design Department	
CHARLES ARTHUR EVERETT, B.T.C.	Chelmsford
Instructor in Chemistry and Dyeing Department	
WILLIAM GEORGE CHACE, Ph.B., M.S.	(On leave of absence)
Instructor in Chemistry and Dyeing Department	
JOHN LESLIE MERRILL, B.T.E.	2026 Middlesex Street
Instructor in Weaving Department	
MILTON HINDLE, B.T.E.	25 Thurston Road, Melrose Highlands
Instructor in Textile Engineering Department	
WALDO WARD YARNALL, B.S.	(On leave of absence)
Instructor in Physical Education	
CHARLES LINCOLN DALEY, B.T.C.	392 Princeton Street
Instructor in Chemistry and Dyeing Department	
CARL ARTHUR CARLSON, B.S., M.E.	(On leave of absence)
Instructor in Textile Engineering Department	
PAUL CHARLES PANAGIOTAKOS, S.B., Ph.D.	290 Branch Street
Instructor in Chemistry and Dyeing Department	
PAUL DAVID PETTERSON	East Chelmsford
Instructor in Textile Engineering Department	
HENRY LELAND PERO, B.T.E.	Chelmsford
Instructor in Wool Department	
ELMER PERCY TREVORS	18 Rhodora Street
Assistant Instructor in Chemistry and Dyeing Department	
WALTER BALLARD HOLT	37 Albert Street
Bursar	
FLORENCE MOORE LANCEY	46 Victoria Street
Librarian	
HELEN GRAY FLACK, S.B.	445 Stevens Street
Secretary	
MONA PALMER MACKENZIE	1424 Bridge Street, Dracut
Clerk	
THERESA DORA LEBLANC	86 White Street
Clerk	

HISTORICAL SKETCH of the LOWELL TEXTILE INSTITUTE

By virtue of legislative acts of 1928, the Lowell Textile School became known as the Lowell Textile Institute in order to define more clearly the standing of the institution. This was the natural result of the development of the original ideas and policies of the trustees who founded the Lowell Textile School. The articles of incorporation were authorized by Chapter 475, Acts of 1895, and provided for a corporation to be known as the Trustees of the Lowell Textile School of Lowell, Massachusetts. The movement for the establishment of the school dates from June 1, 1891, but it was not opened for instruction until February 1, 1897.

In accordance with the acts of incorporation the Board of Trustees consisted of twenty permanent and self-perpetuating members, three-fourths of whom must be "actively engaged in, or connected with, textile or kindred manufactures." In addition, his Honor the Lieutenant-Governor, the Commissioner of Education of the State, the mayor, the president of the municipal council, the superintendent of schools of Lowell, and a representative of the textile council were members *ex-officio*. Legislative acts of 1905 and 1906 authorized the graduates of the school to elect four trustees serving for periods of four years each.

By virtue of the anti-aid amendment to the State Constitution, and by Chapter 274, General Acts of 1918, the property of the school was transferred on July 1, 1918, to the Commonwealth of Massachusetts, and the control and management of the school was vested in a Board of Trustees appointed by the Governor, "with all the powers, rights and privileges and subject to all the duties" of the original Board.

In locating the Institute at Lowell, which has been called the "Mother Textile City of America," considerable advantage is secured by close association with every branch of the industry, which utilizes almost every commercial fiber in the products of the great Merrimack Valley textile district.

Although the school was formally opened by Governor Roger Wolcott on January 30, 1897, in rented quarters in the heart of the city, it was not until January, 1903, that the first buildings of the present plant were ready for occupancy. On February 12, 1903, Governor John L. Bates dedicated the present buildings.

PURPOSE AND SCOPE OF THE INSTITUTE

The object of the establishment of the Institute as set forth in the original act was "for the purpose of instruction in the theory and practical art of textile and kindred branches of industry."

The plan was occasioned by the apparent crisis in the leading industry of New England, due to the rapid development of the manufacture of the coarser cotton fabrics in the southern States. It was believed that this crisis could be met only by a wider and more thorough application of the sciences and arts in the production of finer and more varied fabrics.

Following the general methods and systems found successful at the higher polytechnic institutes, it offers thorough instruction in the principles of the sciences and arts applicable to textile and kindred branches of industry. The courses treat not only of the theory but also the application of these principles in the processes, on the machines and throughout all departments of industry involved in the successful manufacture, application and distribution of textile material in any form.

Though from the first the management has kept in view the clearly defined objective which called for the establishment of the Institute, it has developed its curriculum, its methods of instruction, and equipment as the needs of the industry arose. This objective will be kept constantly in view, and as new demands are presented an effort will be made to extend courses, equipment and floor space. The mechanical equipment of the Institute includes the best makes of textile machinery, and these machines, while built as they would be for regular work, are, as far as possible, adapted to the experimental work which is of particular value in such an institution as this.

Because of the breadth, grade and character of instruction given, and because of the standing and personnel of the instructing staff, the Institute has been placed

by both Federal and State educational boards in the class of the higher technological schools of this country.

The United States Civil Service Commission recognizes graduates from the degree courses of this school as proper applicants for the examination to the various positions requiring a knowledge of applied science and engineering, as well as a knowledge of textile manufacturing, in the different departments of the government.

The courses for those students who can attend the day classes are organized to prepare them to enter some one of the various branches of the textile industry. It is required that all such students shall have an educational background equivalent to that of a complete college preparatory course as given by a recognized high school or academy. These textile courses are either of three or four years duration and are described in detail on the following pages of this catalogue.

The evening classes are held for about twenty weeks of the year, and are for those who are unable to attend the day courses. These are similar to the day courses, but are aimed especially to meet the needs of students working during the day in the mills and shops. For entrance to these classes an applicant should have the equivalent of a grammar school education. A detailed description of these courses and requirements is given in another Bulletin, which will be sent upon request.

BUILDINGS AND GROUNDS

The site is a commanding one, consisting of about 15 acres at a high elevation on the west bank of the Merrimack River. It extends to and overlooks the rapids of Pawtucket Falls, which was the first water power in America to be used on an extensive scale to operate power looms. It was contributed by Frederick Fanning Ayer, Esq., of New York City, and the Proprietors of the Locks and Canals on the Merrimack River.

Southwick Hall, the main building, fronting on Moody Street, was contributed by the Commonwealth of Massachusetts and Frederick Fanning Ayer, Esq., and is a memorial to Royal Southwick, a leading textile manufacturer, a public man of earlier days, and a maternal ancestor of Mr. Ayer. It includes a central mass 90 by 90 feet, having three stories and two wings 80 by 85 feet each with two stories and well-lighted basements. The building is pierced in the center by an arched way from which access is had to the wings and to the central courtyard. The northern wing is occupied by the General Offices, Engineering and Finishing Departments, and Library, while the southern wing is occupied by the Chemistry and Dyeing Departments.

Kitson Hall, dedicated to the memory of Richard Kitson, was contributed by Charlotte P. Kitson and Emma K. Stott, his daughters; the Kitson Machine Company of Lowell, founded by Mr. Kitson, was also a generous contributor. This hall makes a right angle with Southwick Hall, is 70 by 183 feet, has two stories and a basement and houses the Cotton Yarn and Knitting Departments, the Mechanical and Electrical Engineering laboratories and the Machine Shop.

The Falmouth Street Building forms the third side of the quadrangle, and consists of three portions, one 60 by 75 feet, three stories, one 75 by 130 feet, three stories, and the head house 70 by 80 feet, three stories and basement. The building is occupied by the picker section of the Cotton Yarn Department, the Design and Power Weaving Department and by the Woolen and Worsted Yarn Department, and contains on the lower floors an equipment for the manufacture of wool yarn from the fleece to the finished yarn. The upper floors are occupied by a great variety of plain, dobby and Jacquard looms, and in a section of the building are the students' lockers and recreation rooms.

Louis Pasteur Hall. By means of a special appropriation made by the Legislature of 1937 a three story addition was placed on a single story building that was previously known as the Colonial Avenue Building which was erected in 1910. This Hall contains on the first floor the Cotton Finishing laboratory with class rooms and offices of the Wool Department. On the upper floors are found the laboratories, class and lecture rooms, library, and research laboratories of the Chemistry and Textile Coloring Department.

CAMPUS

Through the generosity of Mr. Frederick Fanning Ayer the Institute has been provided with a campus and athletic field of about 3 acres. This has been carefully graded and laid out for football and track athletics.

To enclose this field the Alumni Class Fence has been partly built. It is made of forged iron sections supported between brick columns. Each section is contributed by a class, so that in the course of a few years this fence will entirely enclose the field.

In addition to this field there has been developed during the past few years a larger area that was used for baseball for the first time during 1938. This is located northeast of the Institute buildings and will, it is hoped, be further improved to make a modern campus for baseball and other sports.

GENERAL INFORMATION

Application for Admission.—A blank form of application for admission may be found at the end of this bulletin. This should be properly filled out by all applicants, whether entering upon certificate from a secondary school or presenting themselves for examination.

Freshman Registration.—Each freshman is expected to be in daily attendance beginning Thursday, September 13, at 9.30 A.M., and to follow the prepared program which will be placed in his hands. A program which is planned to acquaint the new student with the institution, its location and surroundings, its courses of instruction, its recreational activities and other phases of its life is arranged for the opening week. Unless arrangements for room and board are made previously, the first two days of the week may be used for this purpose. Physical examinations as well as certain other tests are given during this orientation period. Freshman week enables the student to secure the advantages which come from acquaintance with his surroundings, his instructors, the members of his class, student organizations, activities and customs. The overcrowding of the first week of classes with distractions is thus avoided.

Registration.—All upper classmen are required to register on or before the Monday of the week beginning the school year, and all students during the midyear examination period. For unexcused delay in registration a fee of \$5 will be imposed.

Sessions.—The regular school sessions are in general from 8.50 A.M. to 12.20 P.M., and from 1.25 to 4.00 P.M., except Saturdays, when no classes are held. On Saturdays the buildings are closed.

An hour plan designates the hours at which the various classes meet. This is rigidly adhered to, and the student is marked for his attendance and work as therein scheduled.

Attendance.—Attendance is required of all students on fourteen-fifteenths of all scheduled class exercises, provided they meet the requirements of their instructors for the omitted exercises. For every unexcused absence from any class exercise in excess of those allowed, a deduction will be made from the mark obtained in the course in which the absences occurred.

Advisers.—Advisers are appointed for all students, to be of such aid and assistance as they can both inside and outside of school hours. The head of the department in which a student is registered is adviser to upper-classmen, and instructors in charge of freshmen classes act as advisers to freshmen.

Conduct.—Students are required to return to the proper place all instruments or apparatus used in experimental work, and to leave clean and in working order all machinery and apparatus with which they may experiment. All breakages, accidents or irregularities of any kind must be reported immediately to the head of the department or instructor in charge.

Irregular attendance, lack of punctuality, neglect of either school or home work, disorderly or ungentlemanly conduct or general insubordination are considered good and sufficient reasons for the immediate suspension of a student, and a report to the trustees for such action as they deem necessary to take.

It is the aim of the trustees so to administer the discipline of the Institute as to

maintain a high standard of integrity and a scrupulous regard for trust. The attempt of any student to present, as his own, work which he has not performed, or to pass an examination by improper means, is regarded by the trustees as a most serious offense, and renders the offender liable to immediate suspension or expulsion. The aiding or abetting of a student in any dishonesty is also held to be a grave breach of discipline.

Any student who violates these provisions will be immediately suspended by the president, and the case reported at the following meeting of the trustees for action.

Examinations.—For first-year students examinations are held every five weeks, and these serve to inform the student concerning his standing and the progress made. For students in upper classes examinations will be held during the eighth week of each term. Final examinations are held at the end of each term.

In general, the examinations cover the work of the preceding term, but at the discretion of the instructor may include work of earlier terms.

Examinations for students conditioned in first-term subjects are held during the second term, and examinations for students conditioned in the second-term subjects are held in September following.

Any student who fails to complete a subject satisfactorily or to clear a condition at the time appointed, will be required to repeat the subject, and he cannot be admitted to subjects dependent thereon.

A student whose term's standing is as a whole so low that he cannot continue with profit the work of the next term will be required to leave, but he may return the following year to repeat such subjects as are required.

Daily work and regularity of attendance are considered in making up the reports of standing.

Records and Reports of Standing.—During each term informal reports are sent to parents or guardians and to all students; and at the end of each term formal reports are made.

The daily work of the student forms an important part of his record, and no pupil will be awarded the diploma or degree unless this portion of his record is clear.

Books are prescribed for study, for entry of lecture notes and other exercises, and are periodically examined by the lecturers. The care and accuracy with which these books are kept are considered in determining standing.

Library and Reading Room.—That the students may have surroundings conducive to reading and study a moderate-sized reading room with library tables and chairs has been provided. The library shelves contain textile, art, engineering and scientific publications. These are increased from time to time as new technical books of value to textile students are issued from the press. The leading textile papers are kept on file for ready reference.

The Chemistry and Dyeing Department also has a library supplied with books and periodicals which pertain to chemistry in general and textile chemistry and dyeing in particular.

FEES, DEPOSITS, ETC.

Tuition Fee.—The fee for the day course is \$150 per year for residents of Massachusetts. For non-residents the fee is \$250 per year. The fee for students from foreign countries is \$500 per year.

Three-fifths of the fee is charged for a single term. Each term's tuition is payable during the first week of that term. Students failing to make this payment at the specified time will be excused from classes until satisfactory explanation and arrangements for payment can be made. No report of a student's standing will be mailed unless tuition and fees are fully paid. After payment is made no fee or part thereof can be returned, except by special action of the trustees. The above fee includes free admission for any day students desiring to attend any of the evening classes in which there is accommodation.

Special students pay, in general, the full fee, but if a course be taken involving attendance at the school during a limited time, application may be made to the president for a reduction.

Students entering from Massachusetts are required to file with the Bursar a statement signed by either town or city clerk, stating that the applicant's father is a legal resident of Massachusetts.

Athletic Fee.—An athletic fee of \$15 is due and payable at the time of the first payment of tuition.

Deposits.—Students taking chemistry make a deposit of \$25 the first year, and \$25 each term for the second, third and fourth year chemistry course; students taking machine shop are required to make a deposit of \$10. All other students are required to make a deposit of \$10 each year to cover any general breakage.

All deposits must be made before students can be admitted to laboratory work. The unexpended balance of any deposit will be returned at the end of the year to students not otherwise in arrears.

Rooms and Board.—Students from a distance, requiring rooms and board in the city, may, if they desire, select same from a list which is kept at the Institute. The cost of rooms and board in a good district is \$12 per week and upwards.

Books and Materials.—Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Each student must provide himself with proper outer garments and wear them in such a manner when working in the various laboratories that clothing and person will be protected and not endangered by moving machinery or chemicals.

All raw stock and yarn furnished to the students, and all the productions of the Institute, remain or become its property, except by special arrangement; but each student is allowed to retain specimens of yarn or fabrics that he has produced, if mounted and tabulated in accordance with the requirements of the department. It is understood that the departments may retain such specimens of students' work as they may determine.

No books, instruments or other property of the Institute are loaned to the students to be removed from the premises except by special permission.

Summary of Expenses per Year

Tuition (residents of Massachusetts)	\$150
Tuition (residents of other States)	250
Tuition (foreigners)	500
Chemistry laboratory deposit (1st year)	25
Chemistry laboratory deposit (2d, 3d and 4th years)	50
Athletic fee	15
Machine shop deposit	10
General breakage fee	10

(This applies to students who do not take chemistry or machine shop.)

Books and supplies 50

(Books and supplies for the first year cost about \$80, second and third year \$35, and fourth year \$50, thus averaging about \$50 per year for the four years.)

ENTRANCE REQUIREMENTS

Particular stress should be laid upon a thorough grounding in mathematics, including algebra, arithmetic and plane geometry, as these form the basis upon which the work of this school rests. While solid geometry is not required at the present time, the student will find a knowledge of this subject very valuable in his subsequent work, and is strongly recommended to include this subject as one of his electives. A preliminary course in science, including physics and chemistry, serves to prepare the student's mind for the higher branches of these subjects and their application, but neither will be considered as the equivalent of the courses in these branches given in the Institute.

Degree Courses

Candidates for admission to either of the degree courses must be graduates of a school approved by the New England College Entrance Certificate Board or

by the Board of Regents of New York, and must present a certificate from the principal of the school last attended, reporting upon the subjects pursued and the points obtained according to the schedule of studies given hereafter. A total of fifteen points is required.

A point represents satisfactory work in a year's study in a specified subject in an approved secondary school.

Required Subjects

Algebra A1	1
Algebra A2	1
English	4
Language other than English	2
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 12

Elective Subjects

	Points
Elementary French (two years) or Elementary German (two years) }	2
Advanced French or German (one year in addition to requirements of Elementary French A or Elementary German A)	1
History:	
American	1
Medieval and Modern	1
English	1
Latin	1
Mechanical Drawing	1
Mechanic Arts	1
Solid Geometry	1
Spanish	1
Trigonometry	1

An applicant may also be admitted on the basis of entrance examinations, in which case he must pass a sufficient number of the required subjects to make eleven points and present certificates showing satisfactory courses in such of the elective subjects to make four additional points.

The objective of the elective requirements is to encourage greater breadth of preparation than that covered by the required branches. Certificates covering other subjects than those listed as elective will be entertained.

Diploma Courses

Candidates for admission to the diploma courses are accepted upon presentation of properly vouched certificates showing the completion of a regular four-year course in a high school or academy of reputable standing. The certificate must specify that the applicant has satisfactorily passed the required subjects.

A total of thirteen points is required.

Required Subjects

	Points
Algebra A1	1
Algebra A2	1
English	4
Plane Geometry	1
History (American, Medieval and Modern, or English)	1
Physics	1
Chemistry	1
	<hr/> 10

Elective Subjects

Four may be selected from the list under Degree Courses.

ENTRANCE EXAMINATIONS

All students who are unable to present a certificate for either the degree or the diploma courses must pass entrance examinations. Notification of intention to take these examinations must be made in writing at least a week before the date of the examinations. These will be held as follows:—

Thursday, June 7, 1945; Tuesday, September 11, 1945; Thursday, June 6, 1946:—

Algebra, 9 A.M. to 11 A.M.

History, 11 A.M. to 1 P.M.

English, 2 P.M. to 4 P.M.

Friday, June 8, 1945; Wednesday, September 12, 1945; Friday, June 7, 1946:—

Plane Geometry, 9 A.M. to 11 A.M.

German or French, 11 A.M. to 1 P.M.

Chemistry, 11 A.M. to 1 P.M.

Physics, 2 P.M. to 4 P.M.

Candidates failing to pass the June examinations are allowed to try again in September; those who cannot attend the June examinations may present themselves in September.

REQUIRED SUBJECTS FOR ENTRANCE

Algebra A1.—Derivation and use of simple formulas, graphical representation, the meaning and use of negative numbers, linear equations, with one or two unknown quantities, ratio and proportion, the essentials of algebraic technique, simple cases of exponents and radicals.

Algebra A2.—Numerical and literal quadratic equations in one unknown quantity, the binomial theorem for positive integral exponents, arithmetic and geometric series, simultaneous linear equations in three unknown quantities, simultaneous equations consisting of one quadratic and including graphical solutions, exponents and radicals.

Plane Geometry.—The usual theorems and constructions of good textbooks, including the general properties of plane rectilinear figures, the circle and the measurement of angles, similar polygons, areas, regular polygons, and the measurement of the circle. The solution of original problems and problems in mensuration of lines and plane surfaces.

Chemistry.—Requirements are those of the New England College Entrance Board, or the Board of Regents of New York, including personal laboratory work. Those not meeting the requirements by school or college certificate will be subject to written examination.

English.—As secondary schools are following to a greater extent than heretofore the requirements of the College Entrance Examination Board, it is recommended that the applicant to this school conform to the suggestions of this Board relative to English composition and literature.

The examination consists of two parts, both of which are given at the same time.

(a) With the object of testing the student's ability to express his thoughts in writing clearly and correctly he will be required to write upon subjects familiar to him. Emphasis will be laid upon the composition, punctuation, grammar, idiom and formation of paragraphs. He will be judged by how well he writes rather than by how much he writes.

(b) The second part of the examination is prepared with the view of ascertaining the extent of the student's knowledge of good literature, and to test this examination questions will be based on the books adopted by the National Conference on Uniform Entrance Requirements. Any course of equivalent amount if made up of standard works will be accepted.

History.—Applicants may offer a preparation of American history, English history, or medieval and modern history.

In American history applicants should be familiar with the early settlements in America, the colonies, their government, the customs of the people, and events which led to the establishment of the United States. They should be informed concerning the causes and effects of the principal wars in which the country has been involved. They should be prepared to consider also questions requiring an elementary knowledge of civil government, as well as historical facts connected with the growth of this country up to the present time.

For the subject of English history or medieval and modern history the course given in any reputable secondary school should give proper preparation. A course extending over a full year with not less than three periods a week will be accepted.

Physics.—The applicant should be familiar with the fundamental principles of physics, particularly those considered under the headings of mechanics, heat, light, electricity and magnetism. Textbook instruction should be supplemented by lecture table experiments. Wherever possible, the student should pursue a laboratory course, but for the present no applicant will be conditioned in this subject if he has not been able to carry on a laboratory course. Where a laboratory course is offered by a secondary school, it should cover at least twenty-five of those experiments listed in the syllabus of the College Entrance Examination Board.

Modern Languages.—Required for degree courses only. It is expected that the work in these subjects has covered a period of at least two years of preparatory school training or the equivalent. Importance should be given to the ability to translate into good idiomatic English, but attention should also be paid to grammar and construction, that greater care may be used in translation.

Elementary German A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple German prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into German.

The requirements include the declension of articles, adjectives, pronouns and nouns; the conjugation and inflection of weak and strong verbs; the simpler uses of the subjunctive; the use of the modal auxiliaries; the prepositions and their uses; the principal parts of important verbs; and the elementary rules of syntax and word order.

Texts used in the language courses of any reputable high or preparatory school will furnish reading for translation. A list of texts is offered by the College Entrance Examination Board.

Elementary French A.—The entrance examination is composed of two parts, both taken, however, at the same time.

(a) Translation of simple French prose into good idiomatic English.

(b) Questions to test proficiency in grammar, and simple English sentences to be rendered into French.

The requirements include the principal parts, conjugation and inflection of the regular and the more common irregular verbs; the singular and plural forms of nouns and adjectives; the uses of articles and partitive construction; the forms and positions of personal pronouns; and the simpler uses of the conditional and subjunctive.

Suitable texts are suggested by the language courses of any reputable high or preparatory school and by the requirements of the College Entrance Examination Board.

Students who have pursued two years of elementary French as well as two years of elementary German may present one subject to cover two points in the required subjects, and the other to cover two points in the elective subjects.

ELECTIVE SUBJECTS

History.—If the applicant can present all three or any two branches of history specified he may include one as a required subject and the others in the list of elective subjects.

Solid Geometry.—The usual theorems and constructions of good textbooks, including the relations of planes and lines in space, the properties and measurement of prisms, pyramids, cylinders and cones; the sphere and spherical triangles. The solution of original problems and the applications of the mensuration of surfaces and solids.

Trigonometry.—The usual courses of instruction covered by the standard textbooks on plane and spherical trigonometry will prepare an applicant sufficiently to meet this requirement.

Mechanical Drawing.—The applicant must have pursued such a course in mechanical drawing that he will be familiar with the usual geometrical construction problems, projection of points, lines, planes and simple solids.

Importance is laid not only upon the accuracy with which the work is performed, but upon the general arrangement, appearance and care with which the plates are executed.

It should not be understood that work in this subject may be offered as the equivalent of the first term's work at the Institute.

Mechanics Arts.—The usual courses offered by properly equipped preparatory schools will be accepted as suitable fulfilment of this requirement. Work should include instruction in the handling of both wood and metal working tools in the more simple practices of these arts.

Elementary French B.—Applicants who enter for one of the three-year courses may present one year's work in French in a secondary school. Those who present themselves for examination in this subject should be familiar with the rudiments of grammar, and be able to translate simple French prose into good idiomatic English, also to translate into French English sentences, based on the French given for translation.

Elementary German B.—Applicants who enter for one of the three-year courses may present one year's work in German in a secondary school. What is stated in regard to French applies to those who may present German instead of French.

Advanced French or German.—In cases where applicants have pursued courses in French or German for more than two years, and have completed work which is more advanced than is included under elementary French or German, they may offer the additional year as an elective.

Spanish.—Students offering Spanish should be familiar with elementary grammar, the common irregular verbs, and be able to translate simple Spanish to English or English to Spanish. A preparation equivalent to three periods per week for two years will be acceptable.

Latin.—Students who have pursued one or more years of Latin may present this subject as an elective. Each year's work satisfactorily completed will be considered equal to one point.

ADVANCED STANDING

Candidates who may have received previous training in any of the subjects scheduled in the regular course will, upon presentation of acceptable certificates, be given credit for such work.

COURSES OF INSTRUCTION

Degree Courses.—The four-year degree courses are as follows:

- Textile Engineering.
- Chemistry and Textile Coloring.
- Synthetic Textiles.

At the completion of these courses the degrees of Bachelor of Textile Engineering (B.T.E.) and Bachelor of Textile Chemistry (B.T.C.) are conferred.

Five options are offered in the Engineering Course, viz., general textile, cotton manufacturing, wool manufacturing, design, or sales option. Each of these courses is planned to train one in the fundamental principles of science found to be applicable in the particular fields of textile chemistry and textile engineering. It is maintained that for one to be successful in either of these important branches of industry a training is required as thorough and broad as that of any of the recognized branches of engineering or of applied science.

With this in mind these courses have been built of a secure framework of science and mathematics, and to it has been added the useful application of these branches in the broad textile field. With the direct purpose of laying a secure foundation in the training, a more extended preparatory course is first demanded, and subsequently in the school work more subjects of a general character are included, that narrowness of judgment and observation may not result by overstimulation of the technical development.

Diploma Courses.—The following courses extend over a period of three years and upon the completion of any one of these the diploma of the Institute is awarded:

Cotton Manufacture.

Wool Manufacture.

Textile Design.

These are the original courses offered at the Institute, arranged to require three years' study and to give the student as thorough a training as possible for his chosen field, stressing particularly the study of textiles.

COURSES FOR WOMEN

Within the last few years the possibilities for women in certain branches of the textile field have become recognized and it is believed that in the future the positions open to them will become more and more numerous. Although all classes are open to women, the subject of textile design is especially interesting to some who choose the Textile Engineering Course with the design option, for it offers a broad training that prepares for many lines of activity. For those who wish to specialize in textile designing and art, The Textile Design Course III is recommended. Some are interested in textile chemistry and pursue the Chemistry and Textile Coloring Course. These courses lead to positions either in mill offices or in some commercial lines which are desirable and offer congenial work.

GRADUATE COURSES

By act of the General Court of 1935, authority was given to the Lowell Textile Institute to confer degrees of Master of Science in Textile Chemistry and Master of Science in Textile Engineering to graduate students who satisfactorily complete courses of advanced standing.

The object of the courses is to offer to properly qualified graduates of the Institute who hold bachelor degrees an opportunity to pursue advanced courses in their respective department and to take work in other departments. It is also the object to offer to properly qualified graduates holding bachelor degrees of other institutions of higher learning an opportunity to carry on courses in textile education that will prepare them for entrance to that industry.

Graduates of this Institute will be required to devote at least one year residential study and graduates in general of other institutions at least two years residential study in order to receive the Master degree. Admission to advanced standing may be permitted where the applicant can present work which is approved by the department head as equivalent.

The tuition fees and deposits for graduate students are the same as those required for undergraduates. In general a graduate of this Institute shall devote approximately one third of his course to subjects of advanced character in his own department. One third of his course may be in subjects of his own or other departments not taken in undergraduate work and the remaining third of his course shall be occupied in a thesis of an advanced character and approved by the head of the department.

The courses of study for graduates of other colleges and technological institutions cannot be prescribed in detail for the reason that the selection must depend upon previous scholastic work and standing. They must include the essential subjects of textile education required in the particular department which the applicant elects and must receive the approval of the department head as well as the President and Faculty.

Students with proper preparation may be admitted to advanced courses but cannot be candidates for degrees unless they fulfill the above described requirements. All courses both undergraduate and graduate are open to women.

PHYSICAL EDUCATION AND ATHLETICS

Through competition in athletics and through instruction in classes in physical education the Department of Physical Education attempts to balance the intellectual and mental progress of the students by developing proper health habits, by promoting better physical development, and by inspiring high ideals of sportsmanship.

Physical education and athletics are under the supervision of the Head of the Physical Education Department, who is also Faculty Director of Athletics.

Physical Education

All members of the freshman class are required to take a course in physical training conducted in the gymnasium under the direction of an instructor in physical education. Two periods per week for the entire first year are devoted to this work. At the beginning of the year a full record is made of the physical examinations carried on by the instructor and a reputable physician that proper and beneficial exercise may be prescribed.

The object is to give general instruction in the care and strengthening of the body, and to so guide the students that they may continue to give proper thought to their physical training that their mental development may have its greatest effect.

Proper gymnasium clothing is required and all students must take a shower bath following each exercise.

Athletic Association

All students, by virtue of payment of the student athletic tax, are members of the Athletic Association and are represented by an executive council of sixteen, consisting of the president and athletic representative from each of the four classes, the captains and managers of the three varsity sports, and one representative each from the Pickout and the Textile Players. This Council acts as an advisory body to the Athletic Director, has charge of social and athletic events run by the Athletic Association, and ratifies the awarding of letters and appointment of student managers in the various sports.

The schedules of all sports are arranged with the interest of both the Institute and the individual members of the teams in mind. Admission to all home contests is included in the athletic fee which is paid by each student at the time of registration.

Teams are regularly maintained in varsity football, basketball, and baseball. Recently Textile has been represented by tennis and golf teams and by a junior varsity basketball team. Intramural competition is provided by interclass and interfraternity competition.

SUBJECTS OF INSTRUCTION

In the column headed "Hours of Exercise" the numbers represent for each particular subject the total hours required in school for a period of fifteen weeks.

The letter and number which follow the subjects indicate the department in which the subject is given and the number of the subject in that department. For detailed description of the same, see page 34.

The departments are indicated as follows:—

Textile Engineering	B	Cotton and Knitting	F
Chemistry and Textile Coloring	C	Wool and Worsted	G
Textile Design and Power Weaving	D	Finishing	H
Languages and History	E		

By referring to the letter and number indicated under "Preparation" the student can ascertain what subjects are necessary in order that he may have a clear understanding of the subject which he is scheduled to take.

FIRST YEAR

First Term

(Common to all Courses)

	Hours of Exercise
Elementary Inorganic Chemistry C-10	105
English E-10	45
Mathematics B-10	60
Mechanical Drawing B-13	135
Physics B-11	75
Physical Education	30
Textile Design and Cloth Analysis D-10	75

Second Term

	Course IV	Course V-VI
Elementary Inorganic Chemistry C-10	30	30
Elementary Organic Chemistry C-11	45	45
Elementary German E-11	30	—
English E-10	45	45
Machine Drawing B-13 or B-13a	45	135
Mathematics B-10	60	60
Mechanism B-12	60	60
Physical Education	30	30
Qualitative Analysis C-12 or C-12a	150	45
Stoichiometry C-13	30	—
Textile Design and Cloth Analysis D-10	—	75

For second-term subjects in Courses I, II, and III, see pages 19, 21, 23.

Course I.—Cotton Manufacture

The Cotton Manufacturing Course is intended for students contemplating a career in the manufacture of yarns or fabrics of cotton or the new synthetics processed after the methods used for cotton. As over eighty per cent of the textile fibers consumed in the United States is cotton, it is the policy of the Cotton Department to give the student a thorough course of instruction in handling cotton first. Later, the adaptation of cotton machinery to handle rayon, wool or other fibers is carefully covered. Throughout the work on cotton carding and spinning, reference is made to the possibilities of handling the various rayons, wools or mixes and usually one or more small lots are processed in the laboratory.

During the first term the studies are common to all courses, and include instruction in mathematics, mechanical drawing, physics, textile design and elementary chemistry.

During the second term, lectures in organic chemistry are given followed by lectures in textile chemistry and dyeing the second year. The work in mechanism serves as a basis for all future machine and mechanical work, and is followed by steam engineering, electricity and mill engineering. The course in textile designing, cloth analysis and cloth construction includes lectures on plain, fancy and Jacquard weaves, the analysis of all commercial fabrics, and designs for the same.

The instruction in cotton carding given in the second year covers the production of cotton throughout the world, the classing of various cottons and the various methods of marketing the cotton crop with particular emphasis given to the American cotton crop. The treatment of cotton in the mill processes covers all the operations preparatory to spinning, for the regular cotton system and for the cotton waste systems. Lectures supplement the material available in specially prepared text books. This makes possible instruction regarding the very newest developments in the industry as well as for standard methods and equipment. Considerable time is spent in the laboratory studying cotton fibers, classing, processing stock and making various tests on the adjustment of machines and the effect on the quality of the work produced.

The third year's work continues that of the second year, with detailed study of spinning, spooling, twisting and winding. Another course gives instruction in mill organization, balancing and arranging machinery in the mill. Finally, a brief course is given in the use of the microscope and camera in studying various problems in cotton manufacture. Laboratory practice supplements the lecture course, giving practical operation, adjustment and observation of the machines studied. Advanced laboratory work illustrates the methods of study and analysis of the more general and complex problems such as are usually handled in the laboratory of a textile plant.

Power weaving is taken up during the second and third years. Commencing with lectures and practice upon plain looms, the instruction continues with dobby, box-loom, and Jacquard weaving.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines. Instruction in the finishing of cotton fabrics is given by lectures and laboratory work, and requires considerable work on standard machines in the laboratory. Textile testing, also given in the third year, instructs the student in standard methods for physical testing of textile material.

During both the second and third years, particular attention is given to the preparation of the various reports in order that the student may learn proper methods for presenting data and conclusions resulting from mill studies and tests.

During the third year, each student makes some original study, usually of a technical nature. He must make a formal report of this study satisfactory to the faculty before receiving his diploma.

For detailed description of the subjects see page 34.

Course I.—Cotton Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	30
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	135	Textile Design and Cloth Analysis D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Chemical Technology of Fibers C-20	20	Power Weaving D-24	75
Color D-23c	15	Steam Engineering B-24	45
Cotton Carding F-20	210	Textile Chemistry and Dyeing Lect. C-21	30
Cottons F-22	15	Textile Design and Cloth Construction D-20	90
Physics B-23a	45		

SECOND YEAR. SECOND TERM

Cotton Carding F-21	195	Textile Chemistry and Dyeing Lect. C-21	30
Cotton Waste Processing F-23	30	Textile Design and Cloth Construction D-20	90
Physics B-23a	45		
Power Weaving D-24	135		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Mill Organization F-34	60
Cotton Quality Control F-32	15	Power Weaving D-32	165
Cotton Spinning F-30	135	Staple Fiber Manufacture F-33	15
Electricity B-31a*	30	Textile Testing B-43a	30
Mill Engineering B-34a*	30	Thesis F-36.	

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Power Weaving D-32	120
Cotton Winding and Twisting F-31	225	Thesis F-35.	
Knitting FK-30	105		

* Not given in 1944-45.

Course II.—Wool Manufacture

The course on wool manufacturing is arranged for those who contemplate a career in the manufacture of woolen or worsted fabrics, and can devote but three years to the school work. It includes instruction on all of the varied processes employed in manipulating the wool fiber to produce yarn and cloth, namely, sorting, scouring, carding, combing, spinning, designing, weaving, dyeing and finishing. The work is carried on by lectures, recitations and practical work in the laboratories.

Beginning with the second year the details of manipulating wool from the grease to the finished yarn is taken up for close study. This includes the spinning of woolen yarn, also worsted yarn, by both the English and the French systems. The intermediate processes of sorting, scouring, carding, combing and top-manufacturing are taken in detail and in proper sequence. Instruction in the production and manipulation of re-worked wool is also included.

The general chemistry of the first year is followed by a lecture course in the second year on textile chemistry and dyeing.

Textile design, cloth analysis and construction are continued from the first year throughout the course, the work being applied especially to woolen and worsted goods. Weaving on power looms commences in the second year and continues through the third.

A course in knitting taken during the third year includes the manufacture of flat goods, hosiery and underwear. Considerable laboratory practice accompanies the lecture work, giving the students actual working knowledge of a wide range of knitting machines.

Lectures on finishing commence with the third year and are augmented by extensive practice with the machines in the Finishing Department.

Work in the Engineering Department extends throughout all three years, and includes mechanical drawing, steam engineering and electricity. The practical application of the principles studied in these subjects is brought out forcibly in the work on mill engineering, where mill design and construction are considered. A short course covering methods employed in the testing of fibers, yarns, and cloths, together with laboratory work in the manipulation of certain physical apparatus, is given in the third year.

For detailed description of the subjects see page 34.

Course II.—Wool Manufacture

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry C-10	30	Mechanism B-12	60
Elementary Organic Chemistry C-11	45	Physical Education	30
English E-10	45	Qualitative Analysis C-12a	45
Machine Drawing B-13	135	Textile Design and Cloth Analysis D-10	75
Mathematics B-10	60		

SECOND YEAR. FIRST TERM

Chemical Technology of Fibers C-20	20	Steam Engineering B-24	45
Fiber Preparation G-20-21	240	Textile Chemistry and Dyeing Lect. C-21	10
Physics B-23a	45	Textile Design and Cloth Construction D-21	75
Power Weaving D-24	90		

SECOND YEAR. SECOND TERM

Color D-23W	15	Textile Chemistry and Dyeing Lect. C-21	30
Fiber Preparation G-20-21	240	Textile Design and Cloth Construction D-21	75
Physics B-23a	45		
Power Weaving D-24	120		

THIRD YEAR. FIRST TERM

Electricity B-31a*	30	Woolen and Worsted Finishing H-30	75
Mill Engineering B-34a*	30	Worsted Yarn Manufacture G-30	285
Power Weaving D-32	105		
Textile Testing B-43a	30		

THIRD YEAR. SECOND TERM

Knitting FK-30	105	Worsted Yarn Manufacture G-30	210
Power Weaving D-32	135	Thesis	
Woolen and Worsted Finishing H-30	75		

* Not given in 1944-45.

Course III.—Textile Design

The course in textile design is a three-year diploma course intended for men and women who are attracted by the possibilities in a career designing fabrics. The field is a varied one and includes opportunities for those who desire positions designing staple fabrics, novelty fabrics, elaborate fabrics as well as new combinations for fabrics of great appeal.

A textile designing position is probably one of the most comprehensive positions in the textile industry. The designer's fabric layout is the result of careful reasoning and must include understanding of yarn, weave, weight, finish and wearing qualities. The designer who finds his greatest interest in one of the simplest outlets, such as sheeting, must employ sound judgment in his choice of yarn, closeness of weave and wearing qualities to appeal to public demand. If, on the other hand, the designer inclines toward more elaborate fabrics, such as those fabrics employing many colors, fancy weaves, or combined weaves to bring out a surface pattern, his opportunity for creative expression increases with the intricacy of the fabric in question. A classification of similar fabrics into types would show a number of interesting positions for designers to meet with varying creative ability.

The curricula of the Design Course has been planned so as to supply the student with knowledge and skill to make him an essential individual in the designing field. Approximately sixty-five per cent of the subjects are concerned directly with fabric designing and include both the structural and the decorative. His technical training includes all types of fabric construction and is enhanced by his training in decorative art. The latter has been carefully planned to include subjects which train the student along this line in a systematic manner and which are pertinent to textiles.

A complete list of subjects by terms will be found on page 23. This course includes subjects from every department in the school that are essential to the training of a competent designer.

For detailed description of the subjects see page 34.

Course III.—Textile Design

[For first term see page 17]

FIRST YEAR. SECOND TERM. (HOURS OF EXERCISE)

Elementary Inorganic Chemistry		Mathematics B-10	60
C-10	30	Mechanism B-12	60
Elementary Organic Chemistry		Physical Education (boys) Women	
C-11	45	in Industry (girls)	30
English E-10	45	Textile Design and Cloth Analysis	
Hand Loom Weaving D-11	45	D-10	75
Machine Drawing B-13	135		

SECOND YEAR. FIRST TERM

Chemical Technology of Fibers		Physics B-23a	45
C-20	20	Power Weaving D-24	135
Color D-23	30	Textile Chemistry and Dyeing	
Drawing D-27	30	Lecture C-21	10
Microscopy B-41	60	Textile Design and Cloth Con-	
Perspective D-26	30	struction D-20, 21	165

SECOND YEAR. SECOND TERM

Color D-23	45	Principles of Design D-29	45
Drawing D-27	45	Textile Chemistry and Dyeing	
Fiber and Yarn Identification D-28	45	Lect. C-21	30
Knitting FK-30a	30	Textile Design and Cloth Con-	
Physics B-23a	45	struction D-20, 21	105
Power Weaving D-24	135		

THIRD YEAR. FIRST TERM

Cotton Finishing H-31	75	Textile Marketing B-42*	30
Power Weaving D-32	75	Textile Styling D-35	30
Textile Design and Cloth Con-		Textile Testing B-43a	30
struction D-30, 31	135	Woolen and Worsted Finishing	
Textile Design and Cloth Con-		H-30	75
struction D-40, 41	75		

THIRD YEAR. SECOND TERM

Cotton Finishing H-31	75	Textile Design and Cloth Construc-	
Jacquard Design and Weaving		tion D-30, 31	75
D-34	90	Textile Design and Cloth Construc-	
Power Weaving D-32, 33	120	tion D-40, 41	90

* Not given in 1944-45.

Course IV.—Chemistry and Textile Coloring

The four-year course in Chemistry and Textile Coloring, leading to the degree of B.T.C., is especially intended for those who wish to engage in any branch of textile chemistry, textile coloring, bleaching, finishing or the manufacture and sale of the dyestuffs or chemicals used in the textile industry. The theory and practice of all branches of dyeing, printing, bleaching, scouring and finishing are taught by lecture work supplemented by experimental laboratory work and actual practice in the dyehouse and finishing room.

The underlying theories and principles of chemistry are the same, no matter to what industry the application is eventually made. Furthermore, no industry involves more advanced and varied applications of the science of chemistry than those of the manufacture and application of the coal-tar coloring matters. In addition, the textile colorist must consider the complex composition of the textile fibers, and the obscure reactions which take place between them and the other materials of the textile industry.

During the first year general chemistry, including both inorganic and organic, is taught by lectures and laboratory work, and this is supplemented during the second term by qualitative analysis and stoichiometry.

Advanced organic chemistry is studied during the second and third year as a continuation of the elementary chemistry of the first year, and much time is spent upon quantitative analysis, industrial chemistry, and textile chemistry and dyeing.

The foundation work in general chemistry is continued during the third year with courses in physical chemistry, organic laboratory work and analytical work. The subject of industrial chemistry is introduced, and much time is devoted to advanced textile chemistry, dye testing, color matching, calico printing, and woolen, worsted and cotton finishing.

The fourth year is characterized by an endeavor to present certain subjects of a more applied nature in such a manner that the student's reasoning power and ability to apply the knowledge gained during the first three years may be developed to the fullest extent. Much time is spent in the organic chemistry laboratory, particularly attention being given to the preparation of typical dyestuffs. Thorough courses are given in microscopy, textile testing, and chemical engineering, as applied to textiles. Courses are also given in report writing and textile literature.

During this fourth year the student has an opportunity to take several elective subjects of an advanced nature and conduct such research work and original investigation as time may permit.

For detailed description of the subjects see page 34.

Course IV.—Chemistry and Textile Coloring

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Advanced German E-21	45	Power Weaving D-25	15
Chemical Technology of Fibers C-20	20	Quantitative Analysis C-24	128
English E-20	30	Stoichiometry C-25	15
Mathematics B-20a	60	Textile Chemistry and Dyeing Lab. C-22	105
Organic Chemistry C-23	30	Textile Chemistry and Dyeing Lect. C-21	10
Physics B-23	67		

SECOND YEAR. SECOND TERM

Advanced German E-21	45	Stoichiometry C-25	15
Organic Chemistry C-23	30	Textile Chemistry and Dyeing Lab. C-22	135
English E-20	30	Textile Chemistry and Dyeing Lect. C-21	30
Physics B-23	67		
Quantitative Analysis C-24	173		

THIRD YEAR. FIRST TERM

Adv. Textile Chemistry and Dyeing Lab. C-32	135	Physical Chemistry C-33	45
Adv. Textile Chemistry and Dyeing Lect. C-32	30	Quantitative Analysis C-30	150
Economics E-30	45	Technical German C-35	30
Organic Chemistry C-34	15	Woolen and Worsted Finishing H-30	75

THIRD YEAR. SECOND TERM

Adv. Textile Chemistry and Dyeing Lab. C-32	135	Organic Laboratory C-36	45
Adv. Textile Chemistry and Dyeing Lect. C-32	15	Physical Chemistry C-33	45
Economics E-30	45	Quantitative Analysis C-30	105
Industrial Chemistry C-31	30	Technical German C-35	30
		Woolen and Worsted Finishing H-30	75

FOURTH YEAR. FIRST TERM

Adv. Textile Chemistry and Dyeing Lab. C-44	90	Microscopy and Photomicroscopy C-45	60
Adv. Textile Chemistry and Dyeing Lect. C-44	15	Organic Laboratory C-41	75
Chemical Textile Testing C-43	75	Quantitative Analysis C-46	15
Colloid Chemistry C-50	30	Report Writing C-47	15
Electives or Thesis C-54	90	Seminar in Business English E-40	30
Industrial Chemistry C-42	30	Textile Marketing B-42*	30

FOURTH YEAR. SECOND TERM

Advanced General Chemistry C-49	30	Electives or Thesis C-53	90
Adv. Textile Chemistry and Dyeing Lab. C-44	135	Organic Laboratory C-41	105
Adv. Textile Chemistry and Dyeing Lect. C-44	15	The Chemistry of Rayon C-51	15
Chemical Engineering C-53	45	Technology of Wool Fibers G-40	15
Chemical Textile Testing C-43	45	Textile Literature C-48	30

* Not given in 1944-45.

Course V.—Synthetic Textiles

The course in synthetic textiles is intended for those students who wish to major in the study of synthetic fibers and their manufacture. While much of the content of the course has been given over the past years, this particular arrangement of subjects specializes on rayons, nylons, Aralac and other man-made fibers. The curriculum is laid out to require four years and, upon successful completion of the work, a student will receive the degree of Bachelor of Textile Engineering (B.T.E.).

Owing to the fluidity of developments of synthetic fibers, it is expected that some changes will be necessary from time to time to keep subjects properly balanced.

Freshman subjects are those common to other courses majoring in yarn and fabric manufacturing and are intended as a broad foundation for later work.

During the sophomore year the student begins to specialize in courses covering the various synthetic fibers, their preparation for spinning, and the production of woven fabrics. Owing to the chemical nature of synthetic fibers, considerable emphasis is placed on the study of organic chemistry which is taken at the same time that the student is given instruction in dyes and their application. Courses in mathematics and physics provide scientific background for later technical work.

In the junior year, the textile subjects cover spinning, winding, twisting, weaving, and fabric finishing, with a continuation of engineering work, such as electrical and heat engineering. Economics is given during this year to be followed by Marketing in the senior year.

In the senior year, further fabric finishing, mill organization, knitting, textile testing, and microscopy complete the textile subjects. Accounting and business administration courses give the student some fundamental ideas in these fields, while electrical and mill engineering add to the work of the previous years.

For detailed description of the subjects see page 34.

Course V.—Synthetic Textiles

[For first year see page 17]

SECOND YEAR. FIRST TERM (HOURS OF EXERCISE)

Chemical Technology of Fibers		Synthetic Yarn, Cotton System	
C-20	20	F-24	45
Fiber Study C-26	15	Synthetic Yarn, Wool System G-22	75
Mathematics B-20	60	Textile Chemistry and Dyeing Lec-	
Organic Chemistry C-22	30	ture C-21	10
Physics B-23	75	Textile Design and Cloth Construc-	
Quantitative Analysis C-24s	30	tion D-20, 21	165

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Synthetic Yarn, Cotton System	
Mathematics B-20	60	F-24	75
Organic Chemistry C-22	30	Synthetic Yarn, Wool System G-22	90
Physics B-23	75	Textile Chemistry and Dyeing	
Power Weaving D-25	120	Lecture C-21	30

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Power Weaving D-33	60
Economics E-30	45	Synthetic Yarn, Cotton System	
Electrical Engineering B-31	75	F-35	60
Fabric Finishing H-32	75	Synthetic Yarn, Wool System G-31	90
Heat Engineering B-32	75		

THIRD YEAR. SECOND TERM

Economics E-30	45	Mill Engineering B-34	90
Electrical Engineering B-31	75	Synthetic Yarn, Cotton System	
Fabric Finishing H-32	75	F-35	60
Heat Engineering B-33	90	Synthetic Yarn, Wool System G-31	90

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42	30
Fiber Production C-51	30	Textile Microscopy B-41	60
Electrical Engineering B-44	75	Textile Testing B-43, and C-43 .	105
Mill Engineering B-45	75	Thesis	
Mill Organization F-34	105		

FOURTH TERM. SECOND TERM

Business Administration B-46	90	Mill Engineering B-45	75
Electrical Engineering B-44	75	Mill Illumination B-47	45
Fabric Finishing H-32	105	Thesis	
Knitting FK-30	105		

Course VI.—Textile Engineering

This course is the four-year general textile course leading to the degree of Bachelor of Textile Engineering (B.T.E.), and aims especially to fit men, in the broadest possible manner, to meet the increasing demands of every branch of the textile industry for men with combined textile and technical preparation. The magnitude and scope of the textile and allied industries fully justify the most thorough technical training possible for all who aspire to leadership in this field.

The course is planned so as to provide a foundation in those subjects which are essential to the training of an engineer, coupled with a thorough understanding of textile processes and materials. Such subjects as mathematics, physics, chemistry, drawing, mechanics and mechanism, provide for the first objective. The second is secured by a study of cotton, woolen and worsted yarn manufacturing, textile designing, weaving, knitting, dyeing, and finishing. Instruction is by means of lectures, recitations and laboratory work.

A large proportion of the student's time is spent in well equipped textile departments where he is familiarized with the machinery and processes used in the conversion of cotton and wool fibers into yarns and finished fabrics. The subjects of textile testing and microscopy acquaints the student with the methods for determining the physical properties of textile fibers, yarns and fabrics.

To properly equip the student to meet the varied engineering problems which confront the mill manager or executive, or to so train him that he may enter those industries closely allied to the textile, instruction is given by lecture and laboratory practice in the several branches of engineering. Steam engineering considers the problems involved in steam generation and distribution for power, heating and manufacturing purposes, and includes the testing of laboratory and power plant equipment. The course in electrical engineering treats of the generation and transmission of electrical power, the testing of direct and alternating current machinery, and is intended to acquaint the student with modern practice. Mill engineering familiarizes the student with factory design, construction, heating, lighting, humidification, fire protection, and the arrangement of machinery and buildings for most efficient production and economical power distribution.

The broadening effect of such subjects as English and economics is carried still further in this course by carefully planned courses in business administration, accounting, cost accounting and business law.

During the fourth year the student is required to conduct an original investigation of some textile or allied problem, and to submit the results in the form of a satisfactory thesis before receiving his degree.

The Cotton and Wool Options of the Textile Engineering course have been provided for those students who may desire the breadth of technical training which this course offers but who wish to specialize in either cotton or wool manufacturing. In these optional courses the student's entire time is devoted to the study of that particular fiber which he elects. A demand from the distributing and marketing divisions of the textile industry for properly trained men has led to the establishment of the Sales Option of the Textile Engineering course. This is patterned after the General Course but with more time devoted to such subjects as selling, advertising, marketing, foreign trade and the like. There have also been requests for a four-year degree course in which the design of textile materials should receive the greater emphasis. For this purpose the Design Option of the Textile Engineering course is offered, which, while majoring in textile design, includes other subjects that make a broader course than the one of shorter duration.

In the General Option some recognition is given to those who may wish to lay more emphasis on knit fabrics. This is done by the substitution of knitting laboratory time for a portion of that assigned to weaving laboratory and is dependent on the possibility of arranging for such special cases.

For detailed description of subjects, see page 34. The curricula of the several optional courses will be found on pages 29 to 33.

Course VI.—Textile Engineering (General Course-G)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Chemical Technology of Fibers		Mathematics B-20	60
C-20	20	Physics B-23	75
Cotton Carding F-20b	75	Textile Chemistry and Dyeing	
Fiber Preparation G-20, 21	120	Lecture C-21	10
Machine Drawing B-21.	45	Textile Design and Cloth Construc-	
Machine Shop B-26	75	tion D-22	45

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	45	Mathematics B-20	60
Cotton Carding F-21b	75	Physics B-23	75
Electives		Power Weaving D-24	75
Fiber Preparation G-20, 21	90	Textile Chemistry and Dyeing	
Machine Drawing B-21.	75	Lect. C-21	30

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	45	Heat Engineering B-32	75
Cotton Spinning F-30b	60	Power Weaving D-32	60
Economics E-30	45	Worsted Yarn Manufacture G-30 .	90
Electives		Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting		Mill Engineering B-34*	90
F-31b	60	Worsted Yarn Manufacture G-30 .	90
Economics E-30	45	Woolen and Worsted Finishing	
Electrical Engineering B-31	75	H-30	75
Heat Engineering B-33	90		

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Seminar in Business English E-40 .	30
Cotton Laboratory F-40	45	Textile Marketing B-42*	30
Electrical Engineering B-44	75	Textile Microscopy B-41	60
Mill Engineering B-45	75	Textile Testing B-43	75
Mill Organization F-34	60	Thesis	

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Mill Engineering B-45	75
Cotton Finishing H-31	105	Mill Illumination B-47*	45
Electives B-48 or F-45		Textile Testing B-43b	45
Electrical Engineering B-44	75	Thesis	
Knitting FK-30	105		

* Not given in 1944-45

Course VI.—Textile Engineering (Cotton Option-C)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Chemical Technology of Fibers	Physics B-23	75
C-20 20	Textile Chemistry and Dyeing	
Cotton Carding F-20a 165	Lecture C-21 10	
Cottons F-22 15	Textile Design and Cloth Construc-	
Machine Drawing B-21 90	tion D-20 90	
Mathematics B-20 60		

SECOND YEAR. SECOND TERM

Applied Mechanics B-25 45	Power Weaving D-24 60
Cotton Carding F-21a 105	Textile Chemistry and Dyeing
Cotton Waste Processing F-23 30	Lect. C-21 30
Machine Drawing B-21 30	Textile Design and Cloth Construc-
Mathematics B-20 60	tion D-20 90
Physics B-23 75	

THIRD YEAR. FIRST TERM

Applied Mechanics B-30 45	Heat Engineering B-32 75
Cotton Quality Control F-32 15	Machine Shop B-26 45
Cotton Spinning F-30a 150	Power Weaving D-32 60
Economics E-30 45	Staple Fiber Manufacture F-33 15
Electrical Engineering B-31 75	

THIRD YEAR. SECOND TERM

Cotton Winding and Twisting	Heat Engineering B-33 90
F-31a 180	Mill Engineering B-34* 90
Economics E-30 45	Power Weaving D-32 45
Electrical Engineering B-31 75	

FOURTH YEAR. FIRST TERM

Accounting B-40 45	Seminar in Business English E-40 30
Cotton Laboratory F-40 45	Textile Marketing B-42* 30
Electrical Engineering B-44 75	Textile Microscopy B-41 60
Mill Engineering B-45 75	Textile Testing B-43 75
Mill Organization F-34 60	Thesis

FOURTH YEAR. SECOND TERM

Business Administration B-46 90	Mill Engineering B-45 75
Cotton Finishing H-31 105	Mill Illumination B-47* 45
Electrical Engineering B-44 75	Textile Testing B-43b 45
Knitting FK-30 105	Thesis

* Not given in 1944-45.

Course VI.—Textile Engineering (Wool Option-W)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Chemical Technology of Fibers	Mathematics B-20	60
C-20	Physics B-23	75
Fiber Preparation G-20, 21	Textile Chemistry and Dyeing	
Machine Drawing B-21	Lecture C-21	10
Machine Shop B-26		

SECOND YEAR. SECOND TERM

Applied Mechanics B-25	Physics B-23	75
Fiber Preparation G-20, 21	Power Weaving D-24	75
Machine Drawing B-21	Textile Chemistry and Dyeing	
Mathematics B-20	Lect. C-21	30

THIRD YEAR. FIRST TERM

Applied Mechanics B-30	Power Weaving D-32	60
Economics E-30	Woolen and Worsted Finishing	
Electrical Engineering B-31	H-30	75
Heat Engineering B-32	Worsted Yarn Manufacture G-30 .	150

THIRD YEAR. SECOND TERM

Economics E-30	Woolen and Worsted Finishing	
Electrical Engineering B-31	H-30	75
Heat Engineering B-33	Worsted Yarn Manufacture G-30 .	150
Mill Engineering B-34*		

FOURTH YEAR. FIRST TERM

Accounting B-40	Textile Marketing B-42*	30
Electrical Engineering B-44	Textile Microscopy B-41	60
Mill Engineering B-45	Textile Testing B-43	90
Seminar in Business English E-40 .	Thesis	
Textile Design and Cloth Construc-		
tion D-21		75

FOURTH YEAR. SECOND TERM

Business Administration B-46	Textile Design and Cloth Construc-	
Electrical Engineering B-44	tion D-21	75
Knitting FK-30	Textile Testing B-43b	45
Mill Engineering B-45	Thesis	
Mill Illumination B-47*		

* Not given in 1944-45.

Course VI.—Textile Engineering (Design Option-D)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Chemical Technology of Fibers		Physics B-23	75
C-20	20	Textile Chemistry and Dyeing	
Cotton Carding F-20c	60	Lecture C-21	10
Fiber Preparation G-20, 21	90	Textile Design and Cloth Construc-	
Mathematics B-20	60	tion D-20, 21	165
Perspective D-26	45		

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Power Weaving D-24	60
Fiber Preparation G-20, 21	90	Textile Chemistry and Dyeing	
Mathematics B-20	60	Lect. C-21	30
Physics B-23	75	Textile Design and Cloth Construc-	
Knitting FK-21	30	tion D-20, 21	120

THIRD YEAR. FIRST TERM

Color D-23	30	Textile Design and Cloth Construc-	
Cotton Spinning F-30b	60	tion D-30, 31	105
Economics E-30	45	Worsted Yarn Manufacture G-30	90
Knitting FK-31	45	Woolen and Worsted Finishing	
Power Weaving D-32	75	H-30	75

THIRD YEAR. SECOND TERM

Color D-23	45	Textile Design and Cloth Construc-	
Cotton Winding and Twisting F-31b	60	tion D-30, 31	75
Economics E-30	45	Worsted Yarn Manufacture G-30	90
Power Weaving D-32, 33	105	Woolen and Worsted Finishing	
Principles of Design D-29	30	H-30	75

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Marketing B-42*	30
Jacquard Design and Weaving D-34	90	Textile Microscopy B-41	60
Mill Organization F-34	60	Textile Styling D-35	30
Seminar in Business English E-40	30	Textile Testing B-43	90
Textile Design and Cloth Construc-		Thesis	
tion D-40, 41	75		

FOURTH YEAR. SECOND TERM

Business Administration B-46	90	Textile Design and Cloth Construc-	
Cotton Finishing H-31	105	tion D-40, 41	90
Jacquard Design and Weaving D-34	120	Textile Testing B-43b	45
Machine Shop Practice B-26	45	Thesis	
Perspective D-26	45		

* Not given in 1944-45.

Course VI.—Textile Engineering (Sales Option-S*)

[For first year see page 17]

SECOND YEAR. FIRST TERM. (HOURS OF EXERCISE)

Chemical Technology of Fibers C-20	20	Physics B-23	75
Cotton Carding F-20b	75	Textile Chemistry and Dyeing Lecture C-21	10
Fiber Preparation G-20, 21	105	Textile Design and Cloth Construction D-20, 21	180
Mathematics B-20	60		

SECOND YEAR. SECOND TERM

Cotton Carding F-21c	60	Textile Chemistry and Dyeing Lect. C-21	30
Fiber Preparation G-20, 21	90	Textile Design and Cloth Construction D-20, 21	105
Mathematics B-20	60		
Physics B-23	75		
Power Weaving D-24	105		

THIRD YEAR. FIRST TERM

Color D-23	30	Textile Design and Cloth Construction D-30, 31	105
Cotton Spinning F-30b	60	Worsted Yarn Manufacture G-30	90
Economics E-30	45	Woolen and Worsted Finishing H-30	75
Power Weaving D-32	75		
Principles of Marketing B-35	45		

THIRD YEAR. SECOND TERM

Color D-23	45	Statistics B-52	45
Cotton Winding and Twisting F-31b	60	Textile Design and Cloth Construction D-30, 31	75
Economics E-30	45	Worsted Yarn Manufacture G-30	90
Marketing Methods B-36	60	Woolen and Worsted Finishing H-30	75
Power Weaving D-32, 33	30		

FOURTH YEAR. FIRST TERM

Accounting B-40	45	Textile Design D-41	75
Principles of Selling and Advertising B-49	105	Textile Microscopy B-41	45
Selling Policies B-52	45	Textile Styling D-35	30
Jacquard Design and Weaving D-34	45	Textile Testing B-43	75
		Thesis	

FOURTH YEAR. SECOND TERM

Business Administration B-46	60	Perspective D-25	45
Cotton Finishing H-31	90	Selling Policies B-51	45
Foreign Trade and Economic Geography B-50	45	Spherical Trigonometry and Navigation	45
Knitting FK-30b	75	Thesis	
Machine Shop Practice B-26	45		

* Not given in 1944-45.

SUBJECTS OF INSTRUCTION

TEXTILE ENGINEERING—B

The various options are designated by G, C, W, D, S.

*The subjects listed for the Sales Option will be discontinued for the duration of the war.

Mathematics—B-10. Preparation: Admission Requirements. The work in the first term consists of algebra, plane trigonometry, and instruction in the use of the slide-rule. Algebra is reviewed through quadratics and then logarithms are taken. In plane trigonometry, right and oblique triangles are solved by means of natural and logarithmic functions, and the various algebraic relations among the trigonometric functions are proved and used in identities and equations. Significant figures and the use of approximate data in calculations are also discussed.

In the second term the following topics are taken up: spherical trigonometry and application to navigation, graphical and mathematical solution of quadratic and simultaneous equations, theory of equations, partial fractions, Napierian logarithms, equations of the straight line, equations of various curves, differentiation and integration of algebraic functions, and applications. [All courses.]

Physics—B-11. Preparation: Admission Requirements. Taken simultaneously with B-10. This subject is required as a necessary preparation for all courses, and is given during the first term of the first year. The fundamental principles of this subject are considered absolutely essential to a thorough understanding of the operation of all machinery, textile or otherwise. Some of the topics treated in this course are linear and angular velocity, uniform and accelerated motion, mass, momentum, inertia, effect of force in producing motion, centrifugal force, work, power, energy, principle of moments and its applications, parallelogram and triangle of forces with applications, resolution and composition of forces, the mechanical principles represented by the wheel and axle, differential pulley block, common pulley blocks, jackscrew, worm and wheel, inclined plane, hydrostatics, elements of hydraulics, kinetic energy, circular motion and harmonic motion.

LABORATORY. This course is supplementary to the lecture course and gives the student an opportunity to apply the knowledge gained in the lecture course by performing various experiments. [All courses.]

Mechanism—B-12. Preparation: B-10 and B-11. This subject is also deemed to be one of those absolutely essential to every student's preparation for the work of the following years. Whereas the principles studied are of general application, textile machinery in particular furnishes an unusually large variety of specific examples, and frequent reference is made to these in the development of the course. Some of the important topics covered are gearing and gear train design, belting and pulley calculations, cone and stepped pulley design, cam design, linkages, epicyclic gear trains, and intermittent motion devices. [All courses.]

Mechanical Drawing—B-13. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is taken during the first year and consists of work in the drawing room supplemented by lectures. This subject is considered of the greatest importance as a preparation for the student's future work, and the practical usefulness of drawing of this character is fully emphasized.

This course is systematically laid out covering in order the following divisions:—care and use of drawing instruments; lettering; geometrical constructions; orthographic projection; isometric projection; cross sections; dimensioning; sketching practice on machine details; working drawings; tracing and blueprinting; developments with practical application. [Courses I, II, III, VI.]

Machine Drawing—B-13a. Preparation: Admission Requirements. Taken simultaneously with B-11. This course is similar to B-13, but not so extensive, and is given to students electing the Chemistry and Textile Coloring course. [Course IV.]

Mathematics—B-20. Preparation: B-10. This subject is a continuation of the first year subject B-10, and extends throughout the second year of the engineering course. In the first term the following topics are treated:—exponential functions, the circle, parabola, ellipse, hyperbola, polar coördinates, indefinite

integrals, summation by integration and applications of integration. In the second term the topics are: differentiation of transcendental functions, methods of integration, centers of gravity, moments of inertia, empirical formulas, nomographic charts, and spherical trigonometry and applications. [Course VI.]

Mathematics—B-20a. Preparation: B-10. This subject is a continuation of the work of the first-year subject B-10. A study of the derivatives and differentials is followed by applications of the differential to rates and errors. Other topics treated are the circle, parabola, ellipse, hyperbola, indefinite integrals, summation by integration, areas, volumes, pressures, exponential, logarithmic, trigonometric functions, and spherical trigonometry. [Course IV.]

Machine Drawing—B-21. Preparation: B-10, B-12, B-13. The work in Machine Drawing is devoted to working detail drawings of textile machinery and advanced graphical mechanism problems. In every case the data for all of these problems are taken directly from some of the textile machines that the students use in other departments. [Course VI, Options G, C, W.]

Physics—B-23. Preparation: B-10 and B-11. This subject lays the foundation for later work in engineering and chemistry and also explains the general application of the laws and principles of physics. Instruction, consisting of lectures, demonstrations, and recitations, is given for three hours per week during the second year. The topics taken up the first term are:—wave motion and sound, thermometry, measurement of heat, change of state, expansion, transfer of heat, humidity, elements of meteorology, nature and propagation of light, and photometry.

The second term is devoted to the study of light, magnetism, and electricity. Some of the topics are:—reflection and refraction, lenses, the telescope and microscope, the spectroscope, color sensation, double refraction, magnetism, electrostatics, fundamental laws of direct currents and electrolysis, electronics.

LABORATORY. A two-hour period per week for Course VI and a three-hour period every alternate week for Course IV accompanies the class work in this subject and is planned to illustrate precise methods for measuring various physical quantities. [Courses IV, VI.]

Physics—B-23a. Preparation: B-10 and B-11. This subject consists of the same topics as B-23 but does not contain any laboratory work. [Courses I, II, III.]

Steam Engineering—B-24. Preparation: B-12. This course consists of thirty lectures given in the first term of the second year. Its aim is to give those students who do not take the Textile Engineering Course a general knowledge of thermodynamics, the steam engine, steam turbine and gas engine and their auxiliaries, and waste heat reclamation. [Courses I, II.]

Applied Mechanics—B-25. Preparation: B-11, B-20. This course is divided into two parts: Graphic Statics and Strength of Materials. The first eight weeks of the semester which is devoted to Graphic Statics consists of the study of mathematical and graphical solutions for any system of forces. Centers of gravity and funicular polygons are introduced followed by roof and bridge truss problems under various conditions of dead, live, wind, and snow loading.

During the second half of the semester and during all the following semester, this course deals with Strength of Materials. So far as time permits, such topics as stress, strain, methods of testing materials, bending moments, shearing force, beam design, torsion, design of shafts, compound beams and columns, combined stresses, and like subjects are considered.

This subject is preparatory to the work in Mill Engineering of both the third and fourth years, at which time its practical value and application are clearly demonstrated. [Course VI, Options G, C, W.]

Machine Shop Practice—B-26. Preparation: B-11 and B-12. Systematic instruction is given in the most approved methods of machine shop practice, the object being to familiarize the student with the proper use of hand and machine tools, and the characteristics of the different materials worked. Particular attention is given to the form, setting, grinding and tempering of tools and the mechanism of the different machines involving certain speeds, feeds, etc. The course is so planned that the instruction in each typical operation shall conform as nearly as

possible to commercial machine-shop practice on textile machinery. The list of tools which appears under "Equipment" in this Bulletin gives an idea of the scope of the work, which includes chipping and filing, tool grinding and tempering, straight and taper turning, screw cutting, drilling and boring, planer work, milling machine work, including gear cutting. [Course VI, Options G, C, W.]

Applied Mechanics—B-30. Preparation: B-25. This is a continuation of Applied Mechanics B-25, and is given during the first term of the third year. [Course VI, Options G, C, W.]

Electrical Engineering—B-31. Preparation: B-23. The elementary principles of electricity and magnetism are considered in the lecture course on physics. Their development and application are taken up in this course in a detailed study of the magnetic and electric circuits during the first period of the first term. The second period is devoted to a study of the principles of direct current machinery. The laboratory work consists of a study of technical electrical measurements and dynamo-electric machinery, determining for the latter their operating characteristics.

The second term is devoted entirely to a study of the principles of alternating current circuits, including vector representation, effective values, power, series and parallel circuits. The laboratory work consists of a study of technical electrical measurements, some meter calibration including that of watt-hour meters and a study of alternating current circuits using electrical measuring instruments. [Course VI, Options G, C, W.]

Electricity—B-31a. Preparation: B-23a. This is a short course given in the third year of the manufacturing courses, and consists of thirty lectures covering briefly and in a general way the theory of direct and alternating current generators and motors. [Courses I, II.]

Heat Engineering—B-32. Preparation: B-12, B-20. The purpose of this course is to familiarize the student with the principles of elementary thermodynamics, the properties of steam, mechanical mixtures and combustion of fuels. The course consists of thirty exercises given in the first term of the third year. The lectures and recitations are supplemented with illustrative problems assigned for home preparation.

LABORATORY. The principles underlying the subjects of steam engineering, hydraulics and thermodynamics are demonstrated in a practical manner in the work in the Engineering Laboratory, given three hours per week. Greater importance is attached to the development of initiative and responsibility in the student than the mere accomplishment of a large number of carefully planned tests. The character of this work is indicated by the following list of experiments and tests:—

Calibration of scales, tanks, gauges, inductors and counters; barrel, separating and throttling calorimeter tests; heat exchange tests; boiler inspection and measurement; flue gas analysis; dynamometer tests; ejector and injector tests; Rankin's efficiency, actual thermal efficiency and duty tests; expansion of pipes, radiation and pipe covering tests; boiler test; trap tests, feed water heating tests; steam, triplex and centrifugal pump tests. [Course VI, Options G, C, W.]

Heat Engineering—B-33. Preparation: B-32. This course is a continuation of B-32, and consists of forty-five hours of lectures and recitations given in the second term of the third year of the Textile Engineering course. The subjects developed are the kinematics of reciprocating steam engines, steam turbines and gas engines. Special attention is given to the mechanical principles on which the steam engine operates, with detail discussion of the valve gear and governing devices, and the various diagrams used for studying the same. Consideration is given to the underlying heat theory and to the details of construction of the various parts of the machines. During the latter part of the course the historical development, classification and types of turbines and gas engines are discussed.

LABORATORY. The character of the work in the Engineering Laboratory, given three hours per week during the second half of the third year, is indicated by the following list of experiments:—

Boiler inspection and measurement; Rankin's efficiency, actual thermal efficiency and duty tests; boiler test; valve setting by measurement and by indicator;

condenser test; non-condensing and condensing engine and turbine tests; heating and ventilating fan tests; lap and butt riveted joint test; nozzle test; gas engine test; flow of air and air compressor tests. [Course VI, Options G, C, W.]

Mill Engineering—B-34. Preparation: B-21, B-25. Mill Engineering, as presented in thirty lectures during the third year of the Textile Engineering course, consists of a discussion of the following topics: the investigation of the subsoils for the footing course of the foundation; building materials; design of walls, beams, floors, and construction of windows, doors, stairways and roofs.

Sixty hours of drawing-room and laboratory practice are devoted to plane surveying, contour plotting, cut and fill calculations, setting of batter boards, alignments of shafting and the study from blue-prints of slow-burning construction. [Course VI, Options G, C, W.]

Mill Engineering—B-34a. Preparation: B-21. Mill Engineering, as presented in thirty lectures during the third year of the diploma courses, is largely general in its nature and includes only parts of Course B-34. [Courses I, II.]

***Principles of Marketing—B-35.** An introduction to the basic principles underlying the modern systems of distributing goods with special emphasis on the raw and finished products of the textile industry. The course will cover the history and economic importance and functions in modern distribution of the selling agent, the commission man, the broker, jobber, merchant, factor and other intermediaries as well as the channels that goods may take from the producer to the ultimate consumer. The importance and advantages of each will be studied with special emphasis on the present practice and trends in the textile industry.

Lectures and the case method of instruction will be employed. [Course VI, Sales Option.]

***Marketing Methods—B-36. Preparation: B-35.** A continuation of the Principles of Marketing. The course will be conducted by means of lectures and case problems and discussions. Some of the subjects studied in detail are,—the planning of marketing campaigns, the fluctuations of price and style, forecasting, the business cycle, quotas, market surveys and research, sales planning and control, industrial marketing, and consumer merchandising.

Considerable time will be devoted to the study of current literature and events in the textile field. [Course VI, Sales Option.]

Accounting—B-40. Preparation: B-10 and E-30. The purpose of this course is to acquaint the student with the principles and modern methods of accounting for mercantile and manufacturing businesses. It is not intended to make him a proficient bookkeeper or accountant, but the nature of the subject necessitates a basic knowledge of double-entry bookkeeping, the functions of ledger accounts, and of the use of checks, drafts, notes, vouchers, etc., in ordinary business transactions. This is developed during the summer preceding the senior year by requiring the student to take a course in double-entry bookkeeping, thus saving valuable time during the school year and effectively preparing the ground for the instruction work.

The first half of the course is based on a study of the proper form and content of the balance sheet and profit and loss statement, the principles and problems involved in the correct valuation of asset and liability items, and the related topics of depreciation, reserves, capital, surplus and dividends.

The second half of the course is devoted to cost accounting and is planned to give the student a knowledge of the best cost methods in use at the present time. It includes a thorough discussion of methods of handling and accounting for raw materials, direct labor, the distribution of overhead expenses, normal costs and their predetermination, budgeting, and cost reports and their use. [Course VI.]

Textile Microscopy—B-41. Preparation: B-23. This subject consists of the study of animal and vegetable fibers by means of the microscope and its accessories. It includes methods of illumination, sectioning and mounting, drawing with the camera lucida, measurements of diameter and twist, precision sectioning, and the use of polarized light in the study and identification of fibers. [Courses III, VI.]

***Textile Marketing—B-42. Preparation: E-30.** This subject covers the problems of marketing textile products, with particular emphasis upon the ultimate consumer. The course will survey the principal marketing channels and

marketing methods. Attention is directed to the possibilities of demand creation and demand control, especially through market and style research. Current changes in marketing organization of the industry will be studied and reviewed. [Courses III, IV and VI, Options G, C, W, D.]

Textile Testing—B-43. Preparation: B-23, F-30 or G-30, D-32. This course is planned to familiarize the student with the latest methods and devices for determining the physical properties and characteristics of textile fibers, yarns and fabrics. The scope of the work is indicated by the following topics: abrasion, absorptability, atmospheric control, bursting, crimp, heat transmission, porosity, regain, resilience, stretch, tear, tensile strength, thickness, twist, waterproofness, precision of measurements, interpretation and presentation of data. These are treated both from the standpoint of commercial testing and of textile research. One two-hour period per week of testing laboratory work is included in the course. [Course VI.]

Textile Testing—B-43a. Preparation: B-23, F-20 or G-20, D-20 or D-21. This subject is presented in thirty lecture periods during the third year of the diploma courses. It is similar in content to B-43 but less extensive. [Courses I, II, III.]

Textile Testing—B-43b. Preparation: B-23, F-20 or G-20, D-20 or D-21. A continuation of Textile Testing B-43 into a second term and composed of an additional fifteen hours of laboratory of physical textile testing and thirty hours of chemical testing. [Course VI, Options G, C, W, D.]

Electrical Engineering—B-44. Preparation: B-31. During the first term a detailed study of the alternator is made, with particular stress on generation of three-phase currents. Methods of predetermination of alternator regulation are taken up and at least one method compared with laboratory test. Parallel operation of alternators with accompanying instruments and devices are studied in classroom and laboratory. The single phase, three-phase and Scott transformers are considered in turn and their various methods of connecting to line and alternators are systematically studied.

In the second term the induction motor and generator are studied with their particular adaptability to the textile industry. The principal starting devices for this motor are thoroughly taken up. The synchronous motor is studied particularly in relation to its ability to correct power factor. In all the work outlined above, the main features are illustrated profusely in classroom demonstrations and laboratory exercises. [Course VI, Options G, C, W.]

Mill Engineering—B-45. Preparation: B-34. This subject, given in the fourth year of the Textile Engineering course, includes many new topics, and at the same time coordinates much of the student's previous work in engineering with his knowledge of textile processes and their requirements. In detail it takes up a study of modern types of mill buildings and problems involved in their construction. Such matters as factory location, machinery layout, power transmission, heating, ventilation, humidification, fire protection and sanitary facilities are also discussed. The student is finally assigned the problem of completely designing a textile mill building and laying out its machinery and equipment so far as time permits. [Course VI, Options G, C, W.]

Business Administration—B-46. Preparation: B-10 and E-30. Recognizing the importance which executive work plays in the management of an industrial enterprise, this course has been placed in the curriculum of the Textile Engineering course in order to acquaint the student with some of the fundamental problems and principles involved, and possibly to reveal to him some of his own capabilities for this type of work. The broad topics considered are types of business organizations, financing, administration, planning, control, personnel, and human relationships. The importance of applied psychology to successful management is stressed. The student is made familiar with some of the tools of management such as purchasing systems, storeskeeping, perpetual inventories, warehousing methods, scheduling, routing, tracing, time keeping, motion studies, time studies, mnemonic symbolizing, graphical records, and wage systems.

BUSINESS LAW. Under this subject are given lectures, supplemented by the use of a suitable text, on the law governing contracts, sales, agency, partnerships, corporations, negotiable instruments, bailments and carriers, insurance, personal property, real property, suretyship and guaranty, and bankruptcy. [Course VI.]

***Mill Illumination—B-47. Preparation: B-23.** Because of the demand and the necessity for proper lighting of textile mills, this course is offered three hours per week for one term. It consists of three major parts,—photometry, illumination and installation design. Costs and estimates, safety and production are included.

The laboratory exercises include the study and applications of the photometer, Macbeth Illuminometer and foot-candle meter. The concluding work is a design of a lighting installation for a typical mill room, using the school laboratories for this purpose. [Course VI, Options G, C, W.]

Electives—B-48. Students in the second term of the fourth year of the Textile Engineering course will be permitted to elect certain textile subjects as substitutes for part of the time scheduled for engineering subjects. Thus a student is offered an opportunity for specialized study along such lines as will prove most beneficial to him at that time. The selection of elective studies is subject to the approval of the head of the Textile Engineering department and to the possibility of arranging for the same. [Course VI, Option G.]

***Principles of Selling and Advertising—B-49. Preparation: B-36.** A comprehensive course dealing with the fundamental principles of advertising and selling. The course will cover the psychology of selling and advertising, the legal restrictions in marketing, advertising technique, copy writing, layout, illustrations, advertising campaigns, packaging, advertising mediums, industrial and consumer advertising, creative salesmanship, personality, types of customers, the selling process, supersalesmanship, etc.

Lectures and the case method of instruction will be used. [Course VI, Sales Option.]

***Foreign Trade and Economic Geography—B-50. Preparation: E-30.** The course will cover the foreign markets for finished textiles and the American raw fibers, methods of selling employed, foreign commercial law that an American exporter needs, the foreign fibers and textiles and their importance in international trade.

Special emphasis will be given upon costs of foreign marketing, tariffs, international competition, possible markets and methods of building an export business. [Course VI, Sales Option.]

***Selling Policies—B-51. Preparation: B-36.** This course will cover the development of administrative policies and guiding principles in the marketing, pricing, styling and merchandising of textiles and textile fibers. [Course VI, Sales Option.]

***Statistics—B-52. Preparations: B-20.** A study of elementary statistics which relate to industry, trade and general business and financial conditions. It includes the analysis, presentation and interpretation of statistical data, index numbers, correlation, law of error, cyclical fluctuations, dispersion, trend and other pertinent topics. [Course VI, Sales Option.]

CHEMISTRY AND DYEING—C

Elementary Inorganic Chemistry—C-10. Preparation: Admission Requirements. During the first term of the first year, the class work in this course consists of three lectures, and one recitation per week on fundamental principles, and descriptive chemistry of the non-metallic elements and their compounds. This is accompanied by one afternoon per week of laboratory work, which may be on either inorganic preparations or qualitative analysis, according to the previous laboratory training of the individual student.

In the second term, one lecture and one recitation per week are devoted to the metals and their compounds, and one afternoon per week wholly to qualitative analysis, listed below as C-12. [All courses.]

Elementary Organic Chemistry—C-11. Preparation: Admission Requirements. This course, covered by lectures during the second term, includes a general survey of the fundamental principles of Organic Chemistry, also a study of the hydrocarbons and their derivatives from the point of view of their structure, preparation and uses. This work, although elementary in character, is of sufficient breadth to prepare the student understandingly for the general lectures upon coal-tar dyestuffs which are given in Course C-21. [All courses.]

Qualitative Analysis—C-12. Preparation: C-10, taken simultaneously. This is a continuation of the laboratory study of inorganic compounds, with application to their systematic analysis. It is given ten hours per week to chemists during the second term of the first year. Students with adequate preparation can make further progress by starting this work in place of elementary laboratory exercises during the first term, as indicated under C-10.

When sufficiently advanced, students take up the examination of various products with which the textile chemist must be familiar such as mordanted cloths, pigments and the various dyeing reagents.

SEMI-MICRO QUALITATIVE ANALYSIS.—Qualitative analysis for the more common elements by micro methods, with centrifuge, spot tests, etc. [Course IV.]

Qualitative Analysis—C-12a. Preparation: C-10, taken simultaneously. This course is similar to C-12, but not so extensive, being given three hours per week during the second term. [Courses I, II, III, VI.]

Stoichiometry—C-13. Preparation: C-10, taken simultaneously. Two hours per week during the second term of the first year, on the fundamental principles underlying calculations of quantitative analysis, on the gas laws, and on balancing of chemical equations. [Course IV.]

Chemical Technology of Fibers—C-20. Preparation: C-10, C-11. This course consists of a series of lectures on the origin, composition and processing of the natural fibers; also the manufacture and properties of the artificial fibers. The chemical and physical properties of the fibers which influence their suitability for textile uses are emphasized. The following outline suggests the scope of the course:

Classification of fibers by origin, by importance, and by chemical composition; properties necessary in a successful textile fiber; chemistry of cellulose, cotton, flax, ramie, jute, hemp, kapok; chemistry of proteins, silk, tussah, wool, reclaimed wool, mohair, other hairs; asbestos; manufactured fibers—history, production of filament and staple fiber, methods of delustering, manufacture of high tenacity yarns, details of manufacture of acetate, cupra, viscose, casein, vinyl, and nylon fibers, comparison of the manufactured fibers with each other and with comparable natural fibers. (All courses.)

Textile Chemistry and Dyeing—C-21. Preparation: C-10, C-11, B-12, B-13a. The outline of the lecture course which is given during the second year is as follows:—

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching, fulling and felting of wool; carbonizing; silk-scouring and bleaching; action of soap.

The bleaching of cotton cloth, yarn and raw stock is studied at length with detailed description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is also included an exhaustive study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods for degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods for detection, their effect during the different operations of bleaching, scouring, dyeing and printing and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING AND CLASSIFIED AS DYE STUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds, not dyestuffs, that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting assistants, mordanting principles and leveling agents.

THEORY OF DYEING.—A discussion of the chemical, mechanical, solution and absorption theories, and the various views that have been advanced by different investigators of the chemistry and physics of textile coloring processes.

Under this heading are discussed the general methods of classifying dyestuffs and the definitions of such terms as textile coloring, dyeing, textile printing, substantive and adjective dyestuffs, monogenetic and polygenetic dyestuffs.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, turmeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used within recent years by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown and iron buff.

COAL-TAR COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Special study of basic coloring matters, phthalic anhydride colors, including the eosins and phloxines; acid dyestuffs, Janus, direct cotton, sulphur and mordant colors, including the alizarines and other artificial coloring matter requiring metallic mordants; mordant acid and insoluble azo colors, developed on the fiber; reduction vat colors, aniline black and other artificial dyestuffs not coming under the above heads.

As each class of dyestuffs is taken up, the details of the methods of applying them upon all the different classes of fabrics and in all the different forms of dyeing machines are thoroughly discussed; also the difficulties which may arise in their application, and the methods adopted for overcoming them.

MACHINERY USED IN DYEING.—A certain amount of time is devoted to the description of the machinery used in various processes of textile coloring which is supplemented as far as possible by the use of charts, diagrams and lantern slides.

Most of the important types of dyeing machines are installed within the dye-house of the school, and the students can be taken directly from the lecture room and shown the machines in actual operation. [All courses.]

Dyeing Laboratory—C-22. Preparation: C-21 taken simultaneously. In addition to the lectures in Textile Chemistry and Dyeing practical laboratory work is required. The action of chemical reagents on the various natural and manufactured textile fibers is studied, as well as the preparation of these fibers for dyeing. Some time is also spent in studying the bleaching processes on all fibers. A systematic study of the application of the different classes of dyes to cotton, wool, silk, various rayons and union materials, is carried out. Each student is required to keep a notebook containing samples of treated or dyed material and all data regarding the processes used.

Work in color matching is also carried out on a laboratory scale. A fairly extensive study of the fastness properties of representative dyes of each class is taken up as well as their suitability for various classes of work.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines which are described elsewhere.

By the use of a small printing machine the principles of calico printing are illustrated, and by means of the full-sized dyeing machines and vats the practical side of the subject is studied. It is the constant endeavor of those in charge to impart information of a theoretical and scientific character that will be of value in the operation of a dyehouse. [Course IV.]

Organic Chemistry—C-23. Preparation: C-11. The purpose of this course is to lay a broad foundation for the understanding of the basic principles of organic chemistry. The first semester consists of illustrated lectures and recitations covering the aliphatic series. The second term is devoted to the aromatic compounds. A number of problems are assigned as home exercises in order to fix the fundamental principles of the science in the student's mind. Books: Wertheim—Organic Chemistry and E. H. Huntress—Problems in Organic Chemistry. [Course IV.]

Quantitative Analysis—C-24. Preparation: C-12. The object of this course is to teach the fundamental principles of quantitative analysis, and to give the student an opportunity of acquiring skill in manipulating the special apparatus used in analytical procedure.

Typical gravimetric methods are taught the first term. The samples analyzed comprise salts, minerals and ores. Electrochemical analysis is carried out with the aid of a modern type of apparatus designed for rapid work.

The work of the second term consists of volumetric methods. A number of ores and commercial products, carefully chosen, are analyzed so as to give the student a varied experience.

The laboratory work is supplemented by lectures and recitations. Talbot's "Quantitative Chemical Analysis" 1937 Edition is used as a text. [Course IV.]

Quantitative Analysis—C-24s. Preparation: C-12. The object of this course is to prepare the student for Course C-43 (Chemical Textile Testing). Instruction is given in the use of the analytical balance, in the determination of moisture and ash in fabrics, and in the titration of acids and bases. [Course V.]

Stoichiometry—C-25. Preparation: B-10, C-10, C-13. This subject is taken one hour a week during the second year. Calculations of gravimetric analysis are studied the first term, and calculations of volumetric analysis the second term. Hamilton and Simpson's Calculations of Quantitative Chemical Analysis is used as a text. [Course IV.]

Fibre Study—C-26. Preparation: C-10, C-11, B-12, B-13. A study of the physical and chemical properties of the artificial fibers in comparison with the natural fibers which they sometimes replace and with which they are frequently used. The advantages and disadvantages of each fiber for particular uses are discussed. [Course V.]

Quantitative Analysis—C-30. Preparation: C-24. The fundamental principles acquired in Course C-24 are applied in this course in the examination of materials used in the textile mill, the dyehouse, and the finishing plant. Among the materials analyzed are water, soaps, oils, fuels, and stripping agents. The latest and most practical methods are employed. "Commercial Methods of Analysis" by Snell and Biffin is used as a text. [Course IV.]

Industrial Chemistry—Inorganic—Lecture—C-31. Preparation: C-23. During the second term of the third year lectures and recitations are held in industrial chemistry, the course in general following Riegel's "Industrial Chemistry," Third Edition. Particular attention is paid to the purification of industrial water supplies, the manufacture of heavy chemicals, such as acids, alkalies, bleach liquors and mordants and the building industry, including the manufacture of Portland cement, glass, iron and steel. The course is illustrated as far as possible with specimens, diagrams, and charts. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-32. Preparation: C-21, C-22. This is a continuation of the Textile Chemistry and Dyeing course of the second year, and includes a review of the second year's work in this subject, with the introduction of many advanced considerations, and in addition, the following subjects:—

COLOR MATCHING AND COLOR COMBINING.—A study of that portion of physics which deals with color and the many color phenomena of interest to the textile colorist. The lecture work is supplemented with the practical application of the spectroscope and tintometer, and much practice in the matching of dyed samples of textile material.

The primary colors both of the scientist and textile colorist, the results of combining coloring lights and pigments, and such subjects as color perception, color contrast, purity of color, luminosity, hue, color blindness, dichroism, fluorescence and the effect of different kinds upon dyed fabrics, are discussed under this heading.

Each student's eyes are tested for color blindness early in the course, in order that he may be given an opportunity to change his course if his eyes should prove defective enough to interfere with his work as a textile colorist.

A dark room has been provided where various experiments in color work and color matching may be performed.

DYE TESTING.—This subject includes the testing of several dyestuffs of each class, subjecting them to the common, color-destroying agencies; the determining of their characteristic properties, and their action towards the different fibers; also the determining of the actual money value and coloring power of dyestuffs in terms of a known standard.

Each student is required to make a record of each color tested upon an especially prepared card, which furnishes a permanent record of all dyestuffs, their dyeing properties, fastness to light and weather, washing, soaping, fulling, perspiration, bleaching, steaming, ironing, rubbing, acids and alkalies.

UNION DYEING.—A study of the principles involved in the dyeing of cotton and wool, cotton and silk, and silk and wool union materials in the production of solid and two-color effects.

TEXTILE PRINTING.—A thorough study of the whole subject of textile printing, each student being required to produce individually no less than twenty different prints, including the following styles; pigment style, direct printing style, steam style with tannin mordant, steam style with metallic mordant, madder or dyed style, the ingrain or developed azo style, discharge dye style, discharge mordanted style, resist style, indigo printing, aniline black printing.

The different parts of the calico printing machine are thoroughly studied; also the precautions which must be considered in its use, and the arrangement of the dyeing apparatus which must accompany such a machine.

Special attention is paid to the methods of mixing and preparing the various color printing pastes that are used in the above work upon a manufacturing scale as well as experimentally in the laboratory.

COTTON FINISHING.—A study of the various processes of finishing cotton cloth and the different materials used therein. The work involves the discussion of the various objects of cotton finishing and such operations as pasting, damping, calendering, stretching, stiffening, mercerizing, beetling and filling, and the various machines used for carrying out these processes.

DYE HOUSE AND FINISHING PLANT MANAGEMENT.—A study of the organization and management of the modern bleacheries, dyehouses and finishing plants.

MILL VISITS.—During the third and fourth years visits are made to some of the large dyehouses, bleacheries and print works in the vicinity. [Course IV.]

Physical Chemistry—C-33. Preparation: B-10, C-10, C-13. During the third year, three hours per week of lectures and recitations are given on the application of the experimental methods and calculations or physics to chemical phenomena. Students passing this course may supplement it by the optional laboratory course C-42 in the fourth year. [Course IV.]

Organic Chemistry—C-34. Preparation: C-23. This course (one semester) is a continuation of Organic Chemistry C-23 extending over the alicyclic and heterocyclic series. The lectures also touch upon certain special topics such as general synthetical methods, theoretical considerations, natural products (vitamins, hormones, chlorophyll, the blood pigments, alkaloids), dyestuffs, etc. Book: Panagiotakos—Organic Chemistry. [Course IV.]

Technical German—C-35. Preparation: C-21, C-23, E-21. This course consists of the reading of German technical literature with the object of familiarizing the student with the German and scientific publications in textile chemistry and coloring. [Course IV.]

Organic Chemistry Laboratory—C-36. Preparation: C-21, C-23, C-24. A number of typical organic compounds are synthesized by general methods. A special problem is also assigned to train the student in longer or more difficult syntheses (one semester). Laboratory Book: Gatterman-Wieland—Laboratory Methods of Organic Chemistry. [Course IV.]

Organic Chemistry Laboratory—C-41. Preparation: C-21, C-23, C-24. A number of typical organic compounds are synthesized by general methods. A special problem is also assigned to train the student in longer or more difficult syntheses. Laboratory Book: Gatterman-Wieland—Laboratory Methods of Organic Chemistry. The second semester is devoted to the qualitative identification of organic compounds. Laboratory book: Mulliken-Huntress—Identification of Organic Compounds. [Course IV.]

Industrial Chemistry—Organic—C-42. Preparation: C-31. The chemistry and technology of the important organic industries, *i.e.*, rubber, petroleum, dyestuffs, drugs, explosives, oils, fats, soaps, waxes, plastics, fermentation products, etc., is considered, with special emphasis on rubber, petroleum and explosives in view of present war conditions. Synthetic methods and the research and development phases are stressed. [Course IV.]

Chemical Textile Testing—C-43. Preparation: C-22, C-32. A series of lecture and laboratory periods covering the theory and use of the instruments and methods used in testing and evaluating textile materials.

PHYSICAL TESTING.—Statistical methods, relative humidity, regain, staple, hair weight, fiber resiliency, counts and denier, twist, evenness, cloth count, weight, crimp, thickness, porosity, permeability, waterproofness, wetting out, absorbency, shrinkage, thermal insulating value, handle or draping quality, wear or abrasion, strength and stretch.

CHEMICAL TESTING.—Inorganic extraneous matter: ash, ash alkalinity, silk weighting, acids and alkalies. Organic extraneous matter: scouring loss, extraction, sizing and finishing materials. Fiber mixtures: qualitative analysis, quantitative analysis. Swelling and damage in cellulose fibers: qualitative tests, barium activity number, ash alkalinity, solubility in sodium hydroxide, Methylene Blue absorption, copper number, fluidity. Damage to wool: lead acetate test, thiocyanate test, Pauly test, methylene blue test, sulfur content, total nitrogen content, soluble nitrogen, ammonia nitrogen, solubility in dilute alkali. Damage to silk: Zimmermann test, total nitrogen, ammonia nitrogen, viscosity in zinc chloride.

OPTICAL TESTING.—Colorimeter, tintometer, pH apparatus, refractometer, spectroscope, spectrophotometer, ultra-violet, infra-red, luster. [Course IV.]

Advanced Textile Chemistry and Dyeing—C-44. Preparation: C-32. This is a continuation of the third-year work in Advanced Textile Chemistry and Dyeing, and includes the following subjects:—

CLASSIFICATION AND MOLECULAR STRUCTURE OF ARTIFICIAL DYESTUFFS.—A study from a more advanced standpoint of the classification and constitution of artificial dyestuffs including the various methods used in their production, also the orientation of the various groups which are characteristic of these compounds and their effect on the tinctorial power of dyestuffs.

The object of this study is to give the student a more complete knowledge of the artificial dyestuffs from the color manufacturer's point of view, which will prove of particular value to those who intend later to enter the employ of dyestuff manufacturers or dealers.

ECONOMICS OF THE DYEING, BLEACHING AND FINISHING INDUSTRIES.—A study of the factors to be considered in the establishment of a dyeing, bleaching and finishing plant together with the most essential considerations of its management.

ADVANCED DYEING CONFERENCE.—During the latter part of his course each student will be required to write, for presentation before the other members of his class, a paper upon some assigned subject of general interest. After presentation the subject will be open to discussion and question.

The object of this conference is twofold. First, to give the student experience and practice in systematically looking up an assigned subject and presenting it before others; and secondly, to bring before the class a greater variety of subjects with more detail than could be covered by the general lectures of the course. [Course IV.]

Microscopy and Photomicroscopy—C-45. Preparation: B-23, C-21, C-23. A course of lectures and laboratory experiments on the use and construction of various types of microscopes and accessories, followed by the preparation of longitudinal and cross-sectional mounts of the various fibers. After a study of the different starches, fibers, and fabrics, a series of unknowns are examined and reported upon. [Course IV.]

Quantitative Analysis—C-46. Preparation: C-30. This course consists of lectures, recitations and quizzes on stripping agents and fuels. [Course IV.]

Report Writing—C-47. Preparation: B-20a, E-20. The primary purpose of this course is to enable the student to write a technical report clearly and precisely; to this end it is necessary to present the data efficiently and with due regard

to its accuracy. The meaning and determination of significant figures, the applications of statistical analysis, and the preparation and use of graphs are first studied. Suggestions on experimental work and the interpretation of results are then given. Formal and informal, technical and non-technical, laboratory, plant, and consultants' reports are discussed, and practice is given in their preparation. Instruction is also given on the use of the technical literature and the preparation of bibliographies. [Course IV.]

Textile Literature—C-48. Preparation: C-47. The object of this course is to introduce the student to the classical and current sources of information on textile chemical subjects. Each student is given certain references or subjects to report upon, which are sufficiently varied in origin as to make him familiar with the principal reference works and journals of textile chemistry. [Course IV.]

Advanced General Chemistry—C-49. Preparation: C-10, C-12, C-25, C-34, C-42, C-46. The object of this course is more to correlate the various branches of chemistry studied in the previous three and one-half years than to introduce new material. An attempt is made to show the essential oneness of all chemical knowledge. Recent theories are discussed briefly. [Course IV.]

Colloid Chemistry C-50. Preparation: C-33. A lecture course on general colloid chemistry followed by its applications to textiles.

GENERAL.—Adsorption, surface tension and wetting-out, viscosity, preparation and precipitation of suspensoidal sols, electrophoresis, emulsions, preparation and precipitation of emulsoidal sols, properties of the "irreversible emulsoids", protective colloids, mechanism of detergency and study of commercial detergents, gels and the Donnan Membrane Equilibrium, use of X-rays, properties of proteins, iso-electric point, plastics and plasticity.

TEXTILE APPLICATIONS.—Cellulose, swollen cellulose, hydrocellulose, oxycellulose, ligno-cellulose, cellulose esters and ethers, rayons, starch, pectins and gums, silk, silk weighting, wool, wool scouring, crabbing, fulling, wool shrinkage, casein wool, nylon, synthetic resins of all types, but particularly those used in textile finishing, theories of dyeing and printing. [Course IV.]

The Chemistry of Rayon, Its Manufacture, Bleaching, Dyeing and Finishing—C-51. Preparation: C-32. The students are required to prepare papers on the manufacture and subsequent treatment of rayon and other synthetic fibers. The students present these papers before the class and a question period follows in which the instructor and members of the class bring out important points not covered by the paper.

Lectures and a visit to a rayon plant complete the course. [Course IV.]

Fiber Production—C-52. Preparation: C-20, C-23, H-32. A study of the methods of manufacture of the artificial and synthetic fibers, also the methods of delustering, and preparation of the fibers for the textile market. Consideration is also given to the more important synthetic finishing agents which are used in connection with the artificial fibers for increased crease resistance, improved shrinkage properties, and modified dyeing ability of the fibers. [Course V.]

Chemical Engineering—C-53. Preparation: B-20a, C-31, C-42. This course covers descriptive and quantitative information on the following branches of chemical engineering: flow of fluids, flow of heat, hygrometry, humidification and dehumidification, drying, textile drying, materials of construction, and any of the other unit processes for which there is time. The course consists of lectures supplemented by the working of numerous practical problems. [Course IV.]

Elective Subjects or Thesis during fourth year—C-54. Preparation: Satisfactory completion of all first and second year subjects in Course IV. The value of undergraduate thesis work for all students has frequently been questioned. There is no doubt that many senior students might take elective work of an advanced nature to greater advantage than devoting the same amount of time to specific thesis work. With this in mind several electives have been introduced, each elective period being 45 hours per term and four of these being required during the year.

Thesis. If a student has indicated through the first three years of his work that he is capable of handling an original investigation, a definite thesis subject may be assigned to him which will require the entire 180 hours. At the discretion of the Head of the Department, thesis subjects involving one or more elective periods may also be assigned.

In all cases, however, 180 hours' work of an advanced nature, either of thesis work or elective subjects, will be required for graduation.

Photography. A laboratory course in scientific or record photography, including developing, printing, enlarging, preparation of lantern slides, photography of apparatus and procedures, copying, and use of color filters. This course must be taken in preparation for Photomicroscopy.

Photomicroscopy Laboratory. A series of laboratory experiments followed by a research problem in photomicroscopy. The optical system, exposure, and use of color filters is studied and work is done on both fibers and fabrics. Students taking this elective should have had Photography or the equivalent in experience.

Advanced Microscopy. A laboratory course along one or more of the following lines:—

Quantitative microscopy: deconvolution count, classification and grading of wools, quantitative analysis of fiber mixtures.

Polarized light: production, optical effects, uses.

Cross-sectioning: advanced work on methods and refinements in technique.

Colloid Chemistry Laboratory. Experiments illustrating and amplifying the lecture course are performed. These may be on adsorption, hysteresis, surface tension, wetting-out, dialysis, viscosity, protective colloids, emulsification, detergentcy, gels, swelling, iso-electric point, dyeing.

Textile Chemistry Laboratory. A laboratory course on some branch of textile chemistry of particular interest to the student. This course is usually in the form of directed research.

***Microbiology I.** This course gives a general survey of the effect of the various micro-organisms on textile materials. Consideration is given to the methods of studying molds and bacteria and the methods of preventing their growth on textiles. In the laboratory the isolation, identification and properties of the organisms are studied. The detection of micro-organisms on fibers and damage to fibers caused by their growth is studied in detail. Methods of testing antiseptics to be used on textiles are also studied.

***Microbiology II.** A continuation of Microbiology I, laying special emphasis on the branch of microbiology in which the student is most interested. No lectures are given but each student is required to do certain reading and frequent conferences are held with the instructor. In the laboratory each student selects some problem and works it out as thoroughly as time permits.

Rayon. Advanced study of rayon dyeing.

Physical Chemistry. Measurement of molecular weights, heats of reaction, vapor pressure, surface tension, hydrogen ion concentration, electrical conductivity, etc.

***Advanced Preparative Chemistry.** The student is required to carry through certain preparations starting with a weighed minimum and handing in a weighed product. The preparations are so chosen as to review the principles of inorganic chemistry and at the same time develop the student's laboratory technique. By basing the grade on quantity as well as quality of product obtained, careful technique is encouraged. Conferences and quizzes are given before and after each preparation. The student is constantly required to apply the principles of previous lecture courses in analytical, inorganic and physical chemistry.

Textile—Chemical Engineering—Preparation: B-11, B-12, B-13, B-23, C-21, C-25, C-42. A combination of lectures and laboratory work designed for the study of the thermal properties of fluids, laws of thermo-dynamics as applied to batch and flow processes, flow of heat, mechanical mixtures, and heat engines.

This course will include such practical applications to the dyeing, printing, and finishing branches of the textile industry as efficient use of steam in heating dye

kettles—steam traps—measuring of steam used—calculating steam costs—study of best methods of piping steam for manufacturing purposes and economics of hot water storage.

Compression and fluid handling, testing of pumps, fans and similar chemical engineering equipment including some calibration of instruments will serve to give the student a general over-view of elementary chemical engineering.

***Glass Blowing.** A course in the elements of laboratory glass blowing, designed to give the man going into laboratory work a familiarity with the methods of handling both soda glass and Pyrex. All the ordinary seals and joints used in construction of apparatus are described and tried out in the laboratory.

***Leather Chemistry.** This course deals with the chemistry and technology of leather manufacture as well as with the fundamental chemistry of proteins and enzymatic action. It includes the consideration of high molecular weight compounds, the chemistry of fats and proteins, the action of the leather industry including tanning operations, and various applications of analytical chemistry.

Color Matching. A further study of the principles involved in color matching accompanied by actual matching in the dyeing laboratory of many dyed samples of a variety of colors.

***Explosives and Chemical Warfare.** The history, chemistry, physiological action and military use of the war poisons and of explosives is taken up. The course also treats of the protective measures against chemicals and the tactical use of the weapons.

***Advanced Organic Chemistry.** This course deals with theoretical organic chemistry and the biochemical aspects of the science such as the isolation, proof of structure and synthesis of physiologically important compounds and the chemistry of synthetic compounds of biochemical interest.

TEXTILE DESIGN AND WEAVING—D

Textile Design and Cloth Analysis D-10. Two terms. Instruction is given in the subject of classification of fabrics, use of point or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks, stripes, fancy weaves, including figured and colored effects; producing chain and draw from the design, and vice versa; extending and extracting weaves. This subject also takes up in a systematic manner the analysis of samples illustrating the various cloth constructions for the purpose of determining the design of the weave and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk, and yarns made from the great variety of vegetable and synthetic fibers; grading of yarns, folded, ply, novelty and fancy yarns; problems involving take-up, determination of counts of yarn, and weight of yarn required to produce a given fabric. (First term, all courses. Second term, Courses I, II, III, V, VI, Options C, W, G, D, S.)

Hand Loom Weaving D-11. One term. Preparation: D-10. This work precedes power weaving and consists of making original patterns and cloth construction. This subject correlates with the first year textile design work and aims to stimulate and inspire the student-designer to realize possible combinations of weave and color in a variety of yarns to produce fabrics for different purposes. [Course III.]

Textile Design and Cloth Construction D-20. Two terms. *For Cotton and synthetic fabrics.* Preparation: D-10. In the first term consideration is given to fancy and reverse twills, damasks, skip weaves, sateen fabrics with plain ground. In the second term fabrics studied are those having extra warp and extra filling figured patterns. Both terms include the analysis of the fabrics as well as the necessary calculations required to reproduce the fabric or to construct fabrics of similar character. [First term, Courses I, III, V, VI, Options C, D, S. Second term, Courses I, III, VI, Options C, D, S.]

* Discontinued for the duration of the war.

Textile Design and Cloth Construction D-21. Two terms. *For Woolen, Worsted and Synthetic Fabrics.* Preparation D-10. In the first term instruction is given in the construction and analysis of standard woolen and worsted fabrics containing synthetic yarn or mixes. In the second term instruction is given in the construction of warp and filling backs, double and triple cloths, Chinchillas and extra warp and filling figures. [First term, Courses II, III, V, VI, Options W, D, S. Second term, Courses II, III, VI, Options W, D, S.]

Textile Design D-22. One term. Preparation: D-10. This is a short course covering the elementary principles of designing in general. The term work is divided into two parts. Instruction is given in the theory of shrinkages and the layout of basic woolen and worsted fabrics, followed by similar instruction in the design and construction of basic cotton fabrics. [Course VI, Option G.]

Color D-23. Two terms. This is a study of color, value and chroma using the Munsell Color System. Several plates painted by the student show the application of color to textiles. These plates include perfected harmony and distribution in patterns illustrating stripes, checks, plaids and decorative designs. The influence of colors upon each other is stressed to equip the student with a working knowledge which will aid him in his choice of color for the fabric in question. [Courses III, VI, Options D, S.]

Color D-23c. One term. This is a lecture course covering the same information as D-23 and applied entirely to cotton fabrics. [Course I.]

Color D-23w. One term. This is a lecture course covering the same information as D-23 and applied to woolen and worsted using hand cards and colored stock. [Course II.]

Power Weaving D-24. Two terms. Preparation D-10. This subject includes synthetic and cotton warp preparation. Lectures are given on winding, warping and slashing followed by laboratory work. Lectures and practical work are given on drawing in, harness and box chain building. Weaving lectures cover the fundamental motions, auxiliary motions, names of parts, terms, and types of looms. Detailed instruction is given on all motions commonly found on a cotton loom, their adjustments and timings. [Courses I, II, III; one term Course VI, Options C, W, G, D, S.]

Power Weaving D-25. One term. Preparation: D-10. This is a lecture course and covers briefly the fundamentals of weaving, types of looms suitable for weaving different fabrics, warp preparation, especially slashing machinery and compounds for synthetic, cotton, woolen and worsted yarns and includes blends. [Courses IV, V.]

Perspective D-26. One term. This subject equips the student with a mechanical method of representation. Through the study of vanishing points and measuring points the student learns to represent on a two dimensional surface, objects having three dimensions showing correct proportions as they appear to the eye. This prepares the student for freehand drawing. [Courses III, VI, Option D.]

Drawing D-27. Two terms. Preparation: D-26. This subject consists of freehand practice, by means of progressive steps, in training the eye to see accurately and to develop coordination of the hand to be able to depict a desired effect. It includes quick sketching and finished drawings of objects and nature to build a drawing vocabulary which will be an aid to decorative expression. [Course III.]

Fiber and Yarn Identification D-28. One term. This subject acquaints the student with fiber content, twist and defects of yarns through the use of the microscope. A brief account of how yarn is made is given by means of departmental guest speakers who are experts in cotton, wool, worsted and synthetics. [Course III.]

Principles of Design D-29. One term. Through the principles of decorative design an understanding is acquired for the proper balance, distribution and repetition of motifs suitable for both the woven and the printed pattern. Historic designs of different periods and peoples are thoroughly covered to supply the student with a rich background of decorative information. This source of inspiration is coupled with modern thought and application, as an aid to producing appropriate present day decorative textiles. [Courses III, VI, Options D, S.]

Textile Design and Cloth Construction D-30. Two terms. *For Cotton and Synthetic Fabrics.* Preparation : D-20. This work takes up the more complicated weaves adapted to harness work, and includes the following fabrics: Extra warp and extra filling checks and clipped spots, together with original layouts as might be required by a mill to produce a new pattern; Bedford Cords, Piques, Velveteens, Corduroys, Collar fabrics, multi-ply fabrics, and narrow webbing. The work in cloth construction includes the application of the different weaves and their combinations in the production of fancy designs, both modified and original, the calculations involved in the reproduction of standard fabrics changed to meet varying conditions of weight, stock, counts of yarn and value. Instruction in this subject is intended to bring together the principles considered under the subject of design, cloth construction, weaving, and yarn making of previous years and to show the bearing each has in the successful construction of a fabric. [Courses III, VI, Options D, S.]

Textile Design and Cloth Construction D-31. Two terms. *For Woolen, Worsted and Synthetic Fabrics.* Preparation D-21. This includes cost estimates for worsted and woolen fabrics, and the cost of various blends and mixes of stock and loom production. The work in cloth construction includes the application of the different weaves and their combinations in the production of fancy designs; the calculation involved in the reproduction of various fabrics changed to meet varying conditions of weight, stock, counts of yarn and value. Particular attention is given the construction of new designs by the use of suggestion sheets; the new fabrics to be constructed upon a base fabric, previously analyzed, along the lines outlined on the suggestion sheets, and to keep within the given price range. This includes Designer's Blankets to be worked out as required by the suggestion sheets. [Courses III, VI, Options D, S.]

Power Weaving D-32. Two terms. Preparation: D-20, D-21. This is lecture work on woolen and worsted warp preparation with practical work in the laboratory. Subjects taken up in weaving are Knowles headmotion, woolen and worsted looms including automatics, dobby and Jacquard looms, card cutting and lacing, and pile fabrics and lenos. [Courses I, II, III, VI, Options D, S.; Courses VI C, W, G, one term.]

Power Weaving D-33. One term. Preparation: D-25. Lectures and laboratory work cover warp preparation of synthetics. Subjects taken up in weaving are filling winding, reeds, heddles, shuttles, and loom attachments necessary for the weaving of synthetic fabrics. [Courses III, V, VI Options D, S.]

Jacquard Design and Weaving D-34. Two terms. Preparation: D-10, 20, 29. Instruction includes the sketching of original designs as applied to particular fabrics. This subject correlates with the instruction in weaving of the Jacquard loom and the various tie-ups in common use. The student is taught to transfer his original sketch to cross section design paper, choose the proper weave for both the background and the foreground, cut cards and lace, and weave the fabric. [Courses III, VI, Options D, S.]

Textile Styling D-35. One term. Preparation: D-20, D-21. This subject includes fabric names, their distinguishing characteristics, purpose and suitability. A study of the costume with regard to fashion changes and recurrences as well as influences that in the past have changed costume, as an aid to better forecast of fabrics. [Courses III, VI, Options D, S.]

Textile Design and Cloth Construction D-40. Two terms. *For Cotton and Synthetic Fabrics.* Preparation: D-30. In this course consideration is given to the more complicated fabrics including elastic fabrics, both narrow and wide woven, Marseilles Quilting and Toilet Cloths, plain gauze fabrics, and Fancy Leno-woven cloths using the modern steel doup and super-doup. [Courses III, VI, Options D, S.]

Textile Design and Cloth Construction D-41. Two terms. *For Woolen, Worsted and Synthetic Fabrics.* Preparation: D-31. This includes analysis and reproduction of ply fabrics and combinations of work as outlined on suggestion sheets in D-31. Laboratory instruction is given in the identification of various textiles fibers. In connection with this work samples are analyzed for quality and quantity of fibers present. [Courses III, VI, Options D, S.]

LANGUAGE AND HISTORY—E

English—E-10. Preparation: Admission Requirements. A technically trained man should be able to express himself clearly, forcibly and fluently, as inability to do so will be a serious handicap to him in after life. The object of the English course is to develop the student's power of expression by a thorough study of the principles of advanced rhetoric and composition, and by constant writing of themes illustrative of the four forms of discourse, viz., description, narration, exposition and argumentation. In addition to the study of rhetoric and composition and the writing of themes, several classics such as are not read in the preparatory schools are studied and discussed. [All courses.]

Elementary German—E-11. Preparation: Admission Requirements. This course is intended for first-year students who do not offer German as an entrance requirement and who desire to take the course in Chemistry and Textile Coloring. It may be selected by students taking the Textile Engineering course who have not fully met the entrance requirements in language. The work is elementary in character, and much time is devoted to the study of the rudiments of German grammar with practice in composition. During the latter part of the year considerable attention is given to the reading of ordinary German prose, which serves as an additional preparation to the student for the later reading of works along scientific and industrial lines. [Course IV.]

English—E-20. Preparation: E-10. The curriculum of this course is based upon the sound belief that the young man about to enter business can profit much by the study of the principles and the rules of standard English as applied to business writing. The student is given a comprehensive remedial review of the fundamentals of grammar in their relation to practical expression in writing letters and reports. Class discussions of actual quoted letters, collateral readings, and home preparation of written assignments afford the student abundant opportunity to enlarge his vocabulary and to improve his style. During the second semester, modern essays and other works of fiction are read and discussed. The course meets twice each week. [Course IV.]

Advanced German—E-21. Preparation: E-11. For students taking the course in Chemistry and Textile Coloring the elementary course of the first year is continued throughout the second year. The work consists of the study of some of the more advanced principles of grammar, and especially of the reading of scientific German, dealing with a variety of subjects, and the translation of commercial German. [Course IV.]

Economics—E-30. Preparation: E-10. This course, meeting three times a week, is conducted by means of lectures, discussions, and recitations, supplemented by textbook reading and study of charts analyzing various phases of industrial problems. The character of the course is descriptive and practical rather than theoretical, and the aim is to acquaint the student with the accepted principles of economics and some of their applications to industrial conditions.

The course will also deal briefly with economic history, showing how the present economic system has evolved from past systems and pointing out how the experience of the past can aid in the solution of present problems.

Besides the historical material, other topics discussed are the nature and scope of economics; the evolution of economic society; the three factors of production, land, labor and capital; the four elements in distribution, rent, wages, interest and profits; business organization; value and price; monopoly; money, credit and banking; international trade; protection and free trade; transportation; insurance; economic activities of municipalities; and public finance. In short, it is an outline course dealing with the fundamental principles that underlie a wide range of activities. [Courses IV, VI.]

Seminar in Business English—E-40. Preparation: E-10. This course is a conference course for those who wish to pursue intensive advanced study in the field of business English. Second semester, one hour each week. [Course IV.]

COTTON YARNS AND KNITTING—F

Cotton Carding—F-20. Preparation: B-10, B-12, B-13. This course is given in the first term of the second year and includes instruction regarding the growth, classing and handling of raw cotton and the processes of opening, picking and carding. Considerable time is spent studying cotton production and characteristics so that the student may have a real appreciation of some of the processing problems originating in the cotton itself. The basis of cotton classing is thoroughly covered here and the general background of how cotton is bought and sold is explained.

The mill processes of opening, picking and carding, and the many different types of machines in use are thoroughly studied. Special textbooks with many illustrations have been prepared so that the student may devote his entire attention to class discussions. The calculations pertaining to the various operations are covered in detail. The various settings possible and their effect on quality or production are made clear also.

The laboratory work for this course includes classing practice, fiber study and comparison, waste tests and comparisons, and studies of machine constructions and gearings. [Course I.]

Cotton Carding—F-20a-b-c. Preparation: B-10, B-12, B-13. These courses include the same lectures as course F-20 but the time devoted to laboratory work is reduced progressively in the order given. [F-20a Course VI, Option C; F-20b Course VI, Options G, S; F-20c Course VI, Option D.]

Cotton Carding—F-21. Preparation: F-20. This course, given in the second term of the second year, is a continuation of the work of the first term and includes work on carding, combing, drawing and roving. Here again, special textbooks have been prepared with many illustrations, showing machine cross-sections and details of different actions and parts. While the main part of the work is to clearly explain the purposes and principles of each machine, all the various calculations and settings pertaining to each are carefully studied and problems are assigned for student practice.

The laboratory work required in connection with this course includes a series of specific experiments illustrating various phases of the work of each operation. Other laboratory work consists in processing various lots of cotton in preparation for spinning. [Course I.]

Cotton Carding. F-21a-b-c. Preparation: F-20a-b-c respectively. These courses include the same lectures as Course F-21 but the time devoted to laboratory work is reduced progressively in the order given. [F-21a Course VI, Option C; F-21b Course VI, Option G; F-21c Course VI, Options D, S.]

Cottons F-22. Preparation: F-20 taken simultaneously. This course consists of lectures and laboratory work, supplementary to Course F-20, for those students who study cotton only. Some time is spent on the details of cotton fiber growth and structure and in comparing cotton with other fibers. The economic importance of cotton is studied and sources of information regarding cotton and its processing are given to the class. [Courses I, VI, Option C.]

Cotton Waste Processing—F-23. Preparation: F-20, F-21. For those specializing in Cotton Manufacture, this course provides a survey of the methods and machinery used in processing cotton wastes, or new cotton handled on waste machinery. The lectures consider the sources of the various wastes, their preparatory treatment and the manufacturing processes. Samples of wastes and products are used to demonstrate the possibilities in this field.

The laboratory work of Courses F-20 and F-21 provide practice with some wastes and their processing. [Courses I, VI, Option C.]

Synthetic Yarn, Cotton System—F-24. Preparation: B-10, B-12, B-13. This course, which continues through the entire second year, provides instruction regarding standard machinery used in cotton manufacturing. As much staple fiber is spun on this type of equipment, the work of the course parallels that normally given to students in Cotton Manufacturing. Instruction covers opening, picking, carding, combing, drawing and roving machinery, its construction, principles of operation and the calculations regarding each of the operations.

A limited amount of time is devoted to laboratory practice to demonstrate the machinery being studied, showing actual commercial machines producing material to be used in later operations. [Course V.]

Cotton Spinning—F-30. Preparation: F-21. This course is a continuation of the study of yarn manufacture and covers the many types of regular and long draft spinning. Such details as spindles, rings, travelers and builders are carefully explained and such factors as twist, contraction and strength of yarns are thoroughly studied. Particular consideration is given to the production of yarns for different uses and how desired characteristics may be obtained. All the calculations regarding yarns and spinning frames are thoroughly studied and problems are assigned for student practice.

The laboratory work for this course includes a series of specific experiments and tests illustrating important phases of the operations and practice in spinning various counts from roving which the students have made previously. [Course I.]

Cotton Spinning—F-30a-b. Preparation: F-21a and F-21b-c respectively. These courses include the same lectures as Course F-30 but the time devoted to laboratory practice is shortened in different degrees. [F-30a Course VI, Option C; F-30b Course VI, Option G, D, S.]

Cotton Winding and Twisting—F-31. Preparation: F-30. This course is a continuation of the course on spinning, in which the instruction includes the conclusion of spinning, spooling and the various types of winding, twisting of common and fancy yarns and such incidental features as reeling, baling, mule spinning and rope manufacture. (Some of these items are optional.) All the calculations regarding winders and twisters are thoroughly studied and problems are assigned for student practice.

The laboratory work includes specific studies, experiments and yarn analyses. Other work required involves the winding of yarns under various conditions and the production of plied yarns to meet specified construction. [Course I.]

Cotton Winding and Twisting—F-31a-b. Preparation: F-30a-b respectively. These courses include the same lectures as Course F-31 but the time devoted to laboratory practice is shortened in different degrees. [F-31a Course VI, Option C; F-31b Course VI, Option G, D, S.]

Cotton Quality Control—F-32. Preparation: F-21, F-30, or F-21a, F-30a. While it is customary to point out defects in the materials during the processing in all the laboratory work, this course provides a logical summary of the usual defects which appear in different stages of cotton manufacture. The student is taught to recognize defective work and is given the usual causes of the common defects. The usual procedures and methods necessary to avoid or correct the defects are explained. Many samples of defects are used to illustrate this course. Every effort is made to develop the student's diagnostic ability so that he may readily recognize and remedy new defects as he meets them. [Courses I, VI, Option C.]

Staple Fiber Manufacture—F-33. Preparation: F-21, F-30, or F-21a, F-30a. Using the preparatory courses as a background, this course offers a study of the methods of manufacture of various staple fibers, such as wool, rayon or the new synthetics, on regular or modified cotton machinery. As this is a rapidly changing field, the course is planned to take advantage of the new developments as they appear. Considerable of the work in this course is of the discussion type, which aims to correlate all the work on yarn manufacture and bring it to bear on the processing of staple fibers. [Courses I, VI, Option C.]

Mill Organization—F-34. Preparation: F-21, F-31a or b. This course correlates all the work on Cotton Manufacturing. Starting with a study of actual mill organizations the class is carried forward to problems in developing new organizations for specific types of products. The adaptations for long draft and the handling of staple fibers are carefully covered. The machinery necessary to keep plants in balance is calculated, with some consideration of the best arrangements for economical handling. Some time is given to the use of efficiency work and end breakage studies for cotton mills. [Courses I, V, VI, Options G and C.]

Synthetic Yarn, Cotton System—F-35. Preparation: F-24. Running through both terms of the third year, this course continues the work of staple fiber

manufacture on the Cotton System. The major topics are ring spinning, winding and ring twisting. The subject matter of the lectures covers the construction and principles of regular and long draft spinning equipment, various types of winders and plain and fancy twistors. The calculations for the operations are included, along with analysis and reproduction of various yarns.

A limited amount of time is devoted to laboratory exercises demonstrating these operations and producing various single and ply yarns. [Course V.]

Thesis—F-36. Preparation: F-21, F-30. Each student is required to present a thesis which is a report of some original work. In some cases this is the production of some yarn or fabric to meet certain requirements. In other cases, the thesis is a study of some technical problem regarding the effect of certain changes in manufacturing conditions. [Course I.]

Cotton Laboratory—F-40. Preparation: F-30a or b and F-31a or b. Because of the limited amount of laboratory time available in the second and third years of engineering courses, this time is provided to give additional laboratory practice which will give the student a more thorough acquaintance with cotton manufacturing equipment and its use. Experimental work may be carried on for any operation depending upon how thoroughly previous laboratory work has covered the subject. [Course VI, Options G, C.]

Knitting—FK-21. Preparation: B-12, D-10. This partial course, which is given in the second term of the second year for certain options of the engineering course, covers the first half of the lectures and laboratory work given in Course FK-30. [Course VI, Options, D, G.]

Knitting—FK-30. Preparation: B-12, D-10. This course is a broad survey of the important types of knitting. Considerable stress is placed on the various stitches and the characteristics of fabrics from each. Starting with flat machines, the work advances through small ribbers, automatic hosiery machines, full fashioned hosiery machines, underwear machines and warp knitters. The analysis of knit fabrics and the classifications and routines for manufacture of hosiery and underwear are included.

The laboratory work consists of a series of carefully organized experiments in which the students operate standard machines to produce some knitted article or fabric. Auxiliary equipment for transferring, looping and sewing is available if needed. Fabric and hosiery analysis are included in this work. [Courses I, II, V, VI, Options G, C, W.]

Knitting—FK-30a. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but does not include any laboratory work. [Courses III, VI, Option G.]

Knitting—FK-30b. Preparation: B-12, D-10. This course embraces the same lectures as Course FK-30 but has only one-half the laboratory time. [Course VI, Option S.]

Knitting—FK-31. Preparation: FK-21. Given in the first term of the third year, this is a continuation of Course FK-21 and completes the work given as lectures and laboratory in Course FK-30. [Course VI, Options D, G.]

Knitting—FK-40. Preparation: FK-31. This is an advanced course for students who are specializing in knitting. With the approval of the department, the student may select a particular field from the various sections of the knitting industry and concentrate on its problems. [Course VI, Option G.]

WOOL—G

Fiber Preparation—G-20. Preparation: B-10, B-12, B-13. RAW MATERIALS.—A study of raw materials which enter into the manufacture of woolen or worsted yarns, or which are made into yarns by processes similar to those employed in the manufacture of woolen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel's hair, cotton, flax, hemp, jute, ramie and cut staple.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lecture and by actual sorting of fleece wool under the direction of an

experienced wool sorter. The various characteristics and properties are explained, as are also trade names, such as picklock, XXX, XX, $\frac{1}{2}$ -blood, $\frac{3}{8}$ -blood, $\frac{1}{4}$ -blood, delaine, braid, etc. Some skill is acquired in the estimation of shrinkage and in judging the spinning qualities.

WOOL SCOURING.—The object of scouring and the methods employed are explained, and this involves the consideration of the soaps and chemicals used in scouring; also the waste products and their utilization. Actual work is done in scouring a commercial quantity of wool by machines that are made similar in operation to regular commercial machines. At the same time the use of dryers, their operation and regulation is taken up.

CARBONIZING.—The various methods of stock carbonizing are explained in detail in the lecture course. Actual carbonizing of noil, burr waste, and defective wool is carried out by the sulphuric acid method on commercial size machines in the laboratory.

TOP MAKING AND COMBING.—This branch takes up in all detail the carding of wool on a worsted card, the preparing processes, back-washing and Vigoureaux printing, also gilling of the stock before and after combing. The construction of the gill boxes and combs is studied by lectures and by dismantling and assembling these machines in the laboratories. Later, quantities of stock are made into top and then into yarn.

The Noble comb is studied, and the various calculations to determine draft, noiling, tear, productions, etc., are made. [Courses II, VI, Options G, W, D, S.]

Woolen Yarn and Reworked Fiber Manufacture—G-21. Preparation: B-10, B-12, B-13. REWORKED FIBER.—Rags of all kinds are studied, sorted, and all processes necessary to convert them into fiber are covered in detail.

WOOL BLENDING, OILING AND PICKING.—Mixing and shading of colors and qualities of wool are studied and practiced. The details of Burr Pickers and mixing pickers including the Fearnought are studied in full. The importance of oils and emulsions is stressed in lecture and laboratory.

WOOLEN CARDING.—The system of carding wool for woollen yarn is fully explained, as is also the construction, setting and operation of the cards. A part of the work is the reclothing and grinding of the cylinders, strippers, workers, etc. The carding of suitable and commercial quantities of wool, and the further manufacture of it into yarn, serves to fix the principles of carding in the mind of the student, as well as to give him some skill in handling machinery.

WOOLEN SPINNING.—The computations necessary in converting roping into yarn are fully explained. The details of construction and operation of the spring and cam type mule are well covered in lectures and practice. The theory and practice of continuous or ring spinning for woollen is also taken up. The conditioning of yarn after spinning by steaming is explained.

Costs and details of a yarn mill are mentioned in brief as well as some causes of poor yarn and its effect on mill production. [Courses II, VI, Options G, W, D, S.]

Synthetic Yarn, Wool System—G-22. Preparation: B-10, B-12, B-13. The details of all operations necessary to produce top and woollen yarns are studied in lecture and laboratory with reference to the operating characteristics of synthetic staple fibers when used individually or in blends. The reduction of synthetic yarns and fabrics to fiber suitable for reworking is covered in lectures and laboratory. [Course V.]

Worsteds Yarn Manufacture—G-30. Preparation: G-20. INTERSECTING GILL BOXES AND FRENCH COMB.—The equipment of the laboratory offers opportunity for the production of dry-combed top and its comparison with oil-combed top produced on the Noble comb. The structures and uses of intersecting gill boxes and the study of combing and drawing blends is taken up at this point.

DRAWING AND SPINNING.—The laboratory equipment consisting of the Bradford (English) system of drawing, of both open and cone types, as well as the various processes of French drawing, followed by both worsted mule and ring spinning frame, make possible a thorough study of the manufacture of worsted yarn by all of the existing methods.

The same method of study of mechanisms, calculations, and operations of the

various machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

ORGANIZATION.—At the end of the course the layout of a properly balanced yarn mill is studied, and at the same time the cost of machinery, depreciation, labor costs and machinery arrangements.

THESIS.—Before graduation the student must present visible evidence of his knowledge of woolen and worsted manufacture by the production of twenty yards of fabric from his own design (or reproduction or modification of some existing fabric) beginning with the raw material.

A formal typewritten description, including all calculations and observations, together with samples from each machine, must be presented to the head of the department before the final examination. [Courses II, VI, Options G, W, D, S.]

Synthetic Yarn, Wool System—G-31. Preparation: G-22. The operating characteristics of all machines used in making yarn on the English and French systems are studied in lecture and laboratory with reference to the particular manipulation necessary when synthetic fibers are used individually or in blends. [Course V.]

Technology of Wool Manufacture—Lectures and Demonstrations—G-40. Preparation: C-21, C-32, D-10. This course is planned to supplement the instruction already given in design, cloth construction, chemical technology of fibers, scouring, dyeing and finishing, with sufficient lectures and demonstrations in sorting, scouring, backwashing, gilling, combing, top-making, English drawing, spinning, twisting, warping, and weaving, to make the processing of grease wool and allied fibers into ordinary worsted spun yarn fabrics, clear as to object and continuity.

The manufacture of virgin and reworked wool into woolen spun fabrics, with scouring, carbonizing, mixing, picking, carding, spinning, twisting, warping and weaving is also given. Illustrated descriptions of the manufacture of hardened, woven and needle loom felts are taken up.

Mechanical details and calculations are subordinated to familiarizing the student with the nature and object of the several processes. [Course IV.]

FINISHING—H

Woolen and Worsted Finishing—H-30. Preparation: B-12, C-10, D-10, D-24. The outline of this course, which is given by means of lecture and laboratory work, is as follows:—

BURLING AND MENDING.—Under this head is taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are all considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the early types of stocks, hammer falling and crank stocks, and their modifications and development into the present type of rotary fulling mills of both the single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, methods of covering, regulation and means of adjusting the pressure of traps and rolls, consideration of the shoes, the use and regulation of the various types of stop motion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hygroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of

determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the reduction of various degrees of felt as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The manipulation of the various kinds of goods in the mill, viz., all wool, shoddies and mixed goods, is studied in classroom and by operation in the mill.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods both before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and scours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions, and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING, STEAMING, SINGEING AND CRABBING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing, and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year. [Courses II, III, IV, V, VI, Options G, W, D, S.] [Course V omits Carbonizing, Gigging and Napping.]

Cotton Finishing—H-31. Preparation: B-12, C-10, D-10, D-24. The outline of the course in the finishing of cotton fabrics is as follows:—

CLOTH ROOM.—Instruction of the various goods and the object thereof; construction of the various types of inspecting and trimming machines.

SHEARING.—The object. A consideration of the various types of shears for treating one or both sides at the same time; also the use of the usual cleaning devices, such as emery, sand and card rolls, beaters and brushes; grinding and the adjustment of the various parts.

The use of brushing and cleaning machines, rolling devices and calender attachments for gray goods.

SINGEING.—Developing and object of singeing; the construction of singers of all types and for various purposes; the use of cooling tanks; steaming devices, rolling and brushing attachments.

Regulation of the flame for various goods, and adjustment of the parts; gas and air pressure, water-cooled rolls; the effect of moisture on the cost of singeing and use of dry cans in connection with singeing; electric singeing.

WASHING.—Open width and string washers, their construction and operation; soaps, temperature, squeeze rolls; washing of various goods and the object thereof; stains.

NAPPING.—The object of napping and the usual method of treating goods; various types of nappers, single and double acting; felting nappers; construction, grinding and adjustments of various types.

WATER MANGLES.—Their objects and the construction of various types; various rolls, iron, husk, etc.; scutchers, their object and constructions.

STARCH MANGLES.—The object and construction of all types of starch mangles for pure starch and filled goods; various types of rolls, brass, rubber, wood; action of doctor blades, etc.; regulation and object of pressure.

Methods of starching and finishing all standard goods, also a consideration of the various substances used, such as starch, softener and fillers; the preparation of starch and various methods of application.

DRYERS AND STRETCHERS.—Both horizontal and vertical types of drying cans, tenter frames, clips, etc.; the swing motion and the finishes thus produced; object and construction of spraying machines, belt stretchers, short tenters, button breakers, etc.

CALENDERS.—The object and construction of all types, including the regulation of pressure and nips for the production of various finishes; various types of rolls and their uses,—steel, husk, cotton, paper, etc., the use of hot and cold rolls; chasing, friction, embossing and Schreiner calenders, and the various finishes produced by each; production of watered effects; beetling machines and hydraulic mangles.

Making-up room,—yarding, inspecting; different types of folds; pressing, papering, marking. [Courses I, III, VI, Options G, C, D, S.]

Fabric Finishing—H-32. Preparation: B-12, C-10, D-10, D-24. The outline of the course in the finishing of synthetic fabrics is as follows:

CLOTH ROOM.—Instruction in the handling of the various fabrics.

SINGEING.—The object of singeing; the construction of the various types of singers; the object of the different methods of cooling.

WASHING.—Open width, string and slack rope, and the object thereof.

QUETCH AND MANGLES.—The object and construction.

DRYERS AND STRETCHERS.—Both horizontal and vertical types of drying cans, net dryer, tenter frames, clips, button breakers, etc.

SILK CALENDERS.—The object and construction, including the regulation of pressures.

DECATOR.—The reason for and the methods used.

MAKE-UP ROOM.—Yarding, inspecting, winding, pressing and papering. [Course V.]

EQUIPMENT

The equipment of machinery, inventoried at \$458,000.00, is most varied for textile educational purposes, and is being constantly augmented. The builders of the various machines installed keep in close touch with the Institute, adding to the machines such improvements as are made from time to time. This operates to the mutual advantage of student and manufacturer.

Cotton Yarn Department.—The opening and picking section of this department contains a 50-saw Pratt gin used for experimental purposes. For classing work, there is a special section with north light, where Universal Standard Grades, Government Staple Standards, and many different commercial cottons, American and foreign, are available.

The opening and picking equipment consists of one Saco-Lowell Vertical Opener and a 40-inch Saco-Lowell Three Beater Single Process Picker with a Blending Reserve.

The card section has three standard revolving flat top cards, one each from Saco-Lowell, Whitin, and Howard and Bullough shops.

The combing section consists of a sliver lapper, one four-head ribbon lapper, one two-head comb, and one eight-head comb, all from the Whitin Machine Works.

There is also one two-head Nasmith comb from John Hetherington and Sons of England.

For drawing, there is a two delivery Howard and Bullough head equipped with metallic rolls and electric stop motion. From the Saco-Lowell Shops, there is a railway head and two four delivery heads, one of which is equipped with a Chapman Neutralizer.

The roving section has a Woonsocket 8 x 4 frame with Whitin Superdraft equipment, a full line of regular roving machines—Slubber Intermediate, Fine and Jack from the Saco-Lowell Shops and a Fine frame from Howard and Bullough.

The spinning equipment is quite varied both with respect to builders and with respect to types and sizes. The Saco-Lowell Shops have supplied five different frames varying from 36 to 216 spindles. They are suitable to spin counts from 3s to 80s. Two are equipped with the latest Saco-Lowell Roth Long-Draft System. A sixth Saco-Lowell frame was supplied by the Acme Machine Company equipped with Chapman Ball-Bearing Spindles. The Whitin Machine Works is represented by five frames on which counts from 3s to over 100s can be spun. One of these frames has an auxiliary equipment of SKF Roller-Bearing Spindles and is fitted on one side with Casablanca Long-Draft equipment. Two of these frames are the Fales and Jenks type, one of which has 36 spindles with one side equipped with Casablanca Long Draft system. The other is a 72 spindle frame equipped with the latest Whitin Long Draft system. The Howard and Bullough shops have one spinning frame suitable for counts from average to fine. This is equipped with an English type of builder which distinguishes it from the other frames. An Asa Lees Company mule, suitable for counts above 30's, has been retained to illustrate this peculiar type of spinning.

There is one short spooler from the Saco-Lowell Shops. There are two winders from the Foster Machine Company, one for single ends either on cones or tubes, the other for one, two, or three ends parallel wound, especially for preparation for twisting. There is also a gang Universal No. 50 winder with individual drive suitable for winding ordinary tubes or Franklin Process packages.

The twistors are suitable for all counts. There is one each from the Saco-Lowell, the Howard and Bullough, and the Fales and Jenks Shops. These are all equipped for either wet or dry twisting of average and fine counts. There are two twisters from the Draper Corporation. These are equipped for wet or dry twisting for coarse counts or heavy plies.

To prepare mill wastes for re-use there is one single cylinder roving waste opener and one thread extractor, both from the Saco-Lowell Shops.

The department has a complete coiler waste system as made by the Saco-Lowell Shops, consisting of a 40-inch single coiler side delivery breaker card; a 40-end 20-inch derby doubler; a 40-inch four coiler finisher card and a combination slubber-intermediate. The cards are both equipped with Chapman neutralizers intended to overcome any trouble originating from static electricity.

With the exception of the opening-picking room the humidity in this department is controlled automatically by a system installed by the American Moistening Company. Seven high duty heads supply the necessary moisture and air circulation. An adjustable automatic control regulates the humidity to the desired per cent.

The experimental laboratory is equipped with a power driven skein tester for determining yarn strength and a Moscrop single thread tester for single end strength. There are twist counters for determining the amount of twist and the twist contraction. A seriplane yard winding device and a Saco-Lowell Sliver Tester are used for examining variability of yarns and slivers. For fine work and for fiber study, there is an analytical balance and a Spencer microscope equipped with three objectives, three oculars, ocular micrometer, mechanical stage and Abbé condenser. Other equipment for use in fiber study consists of a Baer Sorter, a hand microtome and projecting apparatus for drawing fiber detail.

Knitting Section.—The winders for this section include a six-spindle No. 50 cone winder, equipped with swifts for winding from skeins, suitable for fine cotton, worsted, silk and rayon yarns, a Payne bobbin winder suitable for coarse woolen, worsted and cotton yarns, and a Foster winder suitable to wind cones or tubes.

Under the group of flat machines there are three Lamb machines, one arranged

for knitting gloves and one arranged for knitting sweaters. In addition to these there is also a Grosser sweater machine, a Jacquard machine, and a link and link machine; two Dubied scarf machines, and a Raschel warp knitter.

In the automatic hosiery machine section are included three Banner machines,—220' and 200 needle full hose machines and a 160 needle half hose machine; four Scott & Williams Machines,—a 200 needle B-5, a 220 needle Model K, a 220 needle HH and a 160 needle RI. This section also includes two Acme stationary cylinder machines and a Mayo model C full automatic. For fundamental instruction a Branson 80 needle hand machine is included. For hosiery legs and tops there are five ribbers, made by the Wildman Company, with cylinders varying from 3-5¼ and arranged for needles varying in number from 100-240; two Brinton ribbers, one arranged for 176 needles and the other 200 needles; one Brinton tie machine, 1¾-inch cylinder 100 needles and 49 needles; one Universal Ribber 3½-inch diameter, 160 needles. To illustrate the fully fashioned type of knitting hosiery there is an 18 section, 39 gauge Reading legger, with topping stand.

The underwear machinery consists of a Scott & Williams ribber, a Wildman ribber, a single head Crane spring needle machine and a two head Tompkins spring needle machine. Melting pots and molds are available for leading needles.

For finishing work this section includes a Grosser 2-thread looper, one Hepworth looper, two Beattie loopers, a Sotco 20-point looper with an individual table and motor drive; five Union Special sewing machines for overseaming, double stitch covering, seaming and welting and vest finishing; seven Merrow sewing machines, including one shell stitch machine and three overseaming and crocheting machines; three Singer machines; three Wilcox & Gibbs sewing machines, including a flat-lock machine.

The Philadelphia Metal Drying Form Company has installed a table of six forms including men's, women's and children's.

For instruction in the manufacture of braids the New England Butt Company has installed one 24-line Hercules braider, one 12-line braider, one tubular braider, and one soutache braider.

Wool Yarn Department. — The following machinery and equipment is available for use in the manufacture of yarn on the woolen principle.

Installed by Davis & Furber Machine Company: One wool mixing picker equipped with hopper feed (George S. Harwood & Son), one modern 60 x 40 three cylinder set of cards with Garnet Breast, single breaker and double finisher, each driven by Westinghouse variable speed motors through silent Whitney chains, improved Bramwell breaker feed by Harwood & Sons, Davis and Furber Broadband intermediate feed and 80 end four bank single apron tape condenser with all change gears and pulleys; one set 48 x 40 cards with single breaker, intermediate, and finisher cylinders, Bramwell breaker feed, latest type Apperly-Harwood transfer feeds with 40 end ring doffers and two apron condenser; one Model B woolen ring spinning frame, motor driven, with 60 spindles 2½-inch rings; one 120 spindle spring mule with bobbin holders by the American Bobbin Holder Company; one 20 spindle 2½-inch ring twister for novelty yarns.

Installed by C. G. Sargent's Sons Corporation: One multiplex burr picker for medium wools, one yarn conditioning machine with motor drive.

Installed by Johnson and Bassett, Inc.: One 120-spindle cam mule complete.

Installed by Torrance Manufacturing Company: One sample mixing card for blending and matching wool.

Installed by B. S. Roy & Son: One card grinding stand with two traverse grinders complete.

Reworked Fiber Division. — Installed by C. G. Sargent's Sons Corporation: One cypress screw acid dip tank; one single apron dryer (baker); one cone carbonizing duster with crush rolls.

Installed by Schaum & Uhlinger, one steam hydro-extractor.

Installed by C. S. Dodge of Lowell, one ball bearing rag picker with condenser, one bagging stand.

Installed by John T. Slack Corporation are many samples of reworked wool in all stages from rags to fiber.

Wool Preparing Division.—Wool sorting and grading is carried on under excellent conditions with the following equipment: sorting bench, baskets, bagging stands.

Installed by C. G. Sargent's Sons Corporation: One grease wool cone duster, one four bowl scouring train with large hopper feed; one single apron dryer with large feeder.

Many samples of all types of wool are available for study.

Top Making Division.—Top for the Bradford or French system is made with the following machinery: One double cylinder worsted card (four licker-in) with can coiler and balling head, complete, by Davis & Furber Machine Company, and with a Bramwell automatic feeder supplied by George S. Harwood & Sons. An electric neutralizer is furnished on card by the Chapman Electric Neutralizer Company. This section also includes a double bowl, 5-cylinder backwasher, with gill box, Taylor-Wordsworth & Co., equipped with blueing motion, oiling motion, and Layland patent pressure motion; a weigh gill box and creel and one doubling balling head gill box (with double screws) made by the Saco-Lowell Shops; two worsted combs with baller punch, one made by Crompton & Knowles, and the second made by James Smith & Sons; two finishing gill boxes, one known as a can gill box and the other a balling head gill box, both made by Hall & Stells.

Worsted Yarn Division.—Bradford or English System: For the manufacture of yarns under the Bradford System of Drawing, Spinning, and Twisting, the following machinery as made by Prince Smith & Son, make up the equipment: one revolving creel for 12 balls, one 2-spindle drawing box, one 4-spindle first finisher, one 12-spindle dandy reducer, one 12-spindle cap frame, one double head can gill box, one 2-spindle gill box, one 2-spindle flyer frame, one 12-spindle ring frame, one 12-spindle 2-fold cap twister, one 12-spindle 6-fold ring twister. One 36-spindle ring spinning frame with motor drive has been installed by Whitin Machine Works. In addition to this the Saco-Lowell Shops have installed the following machinery to carry on similar work: one 2-spindle drawing box, one 6-spindle second finisher, one 24-spindle dandy rover, one 6-spindle cone reducer, one 8-spindle cone rover, one 48-spindle cap spinner, 5-foot end, one 48-spindle cap spinner, 4-foot end, one 48-spindle Boy ring twister. The Lindsay-Hyde Company has installed a modern skein winder.

The humidity in the laboratory as well as in the testing laboratory of the woolen yarns and of the English system of worsted yarns is maintained by the American Moistening Company's system of six humidifiers and four Comin's High Duty heads, under automatic control.

French System.—For the manufacture of worsted yarns under the French System of Drawing and Spinning the machinery was made by the Société Alsacienne de Constructions Mécaniques, and the equipment consists of the following: Model P. L. B. comb with creel for 24 doublings, intersecting gill box (2 heads) equipped with oiling device, gill box (2 heads), first drawing (2 heads), second drawing (2 heads), third drawing (2 heads), reducer (4 porcupines), slubber (8 porcupines), first intermediate (8 porcupines), second intermediate (8 porcupines), rover (8 porcupines), finisher (16 porcupines), self-acting worsted mule (150 spindles).

The Saco-Lowell Shops built and installed a ring spinning frame of 60 spindles for worsted yarns equipped with individual General Electric Company's motor and a Reeves Variable Speed Transmission.

Twenty-one turbo humidifier heads automatically controlled by a humidity regulator have been furnished by the G. M. Parks Company. The compressed air for these heads is supplied by an Ingersoll-Rand 8 by 8 steam-driven air compressor.

Testing Equipment.—For routine mill and research testing a conditioning room is provided which is humidified by G. M. Parks Company equipment.

Testing machines include the following: Henry L. Scott & Company skein and fabric tester; one Emerson conditioning oven with Toledo scales; one Bausch & Lomb projecting microscope for fiber analysis; one Alfred Suter top stapling machine with scales; one top inspection stand with duplex mercury lamp lighting; one Edgerton stroboscope; five copper bowls for scouring by hand; complete set of U. S. wool standards for fiber comparison.

Design and Power Weaving Department.—In the fabric analysis section there have been provided chemical balances made by Volland & Sons and Christian Becker, necessary twist testers, microscopes, reels, etc., as well as a Torsion calculation balance made by the Torsion Balance Company.

In the warp preparation room, the cotton section includes a Universal cone winder, an Entwistle warper and a Saco Lowell slasher. The woolen and worsted section includes two jack spoolers, one wet and one dry dressing frame, an 82-inch reel, an 94-inch reel, and one double head beamer all supplied by the Davis & Furber Machine Co. The silk and rayon section includes a winder, narrow warper and beamer.

The filling winding section contains a Universal No. 90 winder and a Davis & Furber 40-end jack winder.

The weave room contains a total of 57 looms. The cotton section of 40 looms includes one wide sheeting loom, one wide blanket loom, one wide table cloth loom, 24 narrow looms for sheeting, towels, shirting, etc., and 13 Jacquard looms for towels, napkins, dress goods, carpets, overdrapes, etc. The woolen and worsted section of 12 looms includes 3 wide looms and 9 narrow looms for suitings, coatings, and blankets. The silk and rayon section of 5 looms includes 2 broad looms, one narrow loom and 2 Jacquard looms for shirtings, dress goods, over-drapes, etc.

Chemistry and Dyeing Department.—The General Chemistry and Qualitative Analysis Laboratory provides facilities for 120 students.

The Quantitative Analysis Laboratory contains two steam plates, drying closets, a gas hot plate, a Kjeldahl digestion unit and electro-analysis apparatus. Special apparatus used by the advanced quantitative class includes the following equipment: Abbe refractometer, Becker chainomatic Westphal balance, two Saybolt Universal viscosimeters, 1 Engler viscosimeter, Pensky-Martin flash tester, two Cleveland open cup testers, Conradson carbon residue apparatus, Titer test apparatus and Emerson oxygen bomb calorimeter. The balance room has 14 Christian Becker analytical balances and a Christian Becker calibration balance.

The Chemical Textile Testing Laboratory contains the following: Scott serigraph strength tester, Scott single strand strength tester, drying oven and analytical balance combination, twist counters, yarn reels, barometer, hygrometers, sling psychrometers, thickness gauge, duNuoy tensiometer, pick glasses, extraction apparatus, heat transfer apparatus, waterproofness apparatus and the usual chemical apparatus and balances.

The Organic Laboratory has the necessary equipment required in the preparation of basic organic compounds, also instruments such as autoclaves, electric and gas combustion furnaces used in the manufacture of dyes.

The Microscopy and Optical Testing Laboratory contains a polarizing microscope, binocular microscope, twelve ordinary microscopes, rotary microtome, table microtome, Hardy sectioning device, comparison ocular, vertical illuminator, camera lucia, a large number of microscope lamps of various types, dark ground illuminators, polarizing equipment, dipping refractometer, Abbe refractometer, several spectrosopes, Duboseq colorimeter, Lovibond tintometer, ultra violet and infra-red radiation sources, optical pH apparatus and the necessary auxiliary equipment.

The Experimental Dyeing Laboratory is equipped with steam heated dyeing baths and individual benches, reels and balances. There is also an ageing chamber and a Philadelphia Drying Machinery Company's Hurricane Dryer besides a large collection of dyestuffs.

The Experimental Printing Laboratory is equipped with a power-driven, full-sized, two-roll calico printing machine, and a smaller one-roll, power-driven printing machine, both made by Rice, Barton & Fales, and a small hand-driven, laboratory printing machine, an iron-jacketed steaming chamber, and a set of steam-jacketed copper kettles.

To give instruction in dyeing on a basis which is more comparable with commercial practice there is provided a laboratory which includes the following equipment: a small kier, fitted with E. D. Jefferson's circulating device, a Permutit filter; a mercerizing machine; raw stock and yarn dyeing machines by Klauder-Weldon Dyeing Machine Company; a jig dyeing machine; a chain dyeing machine.

a raw stock drying table; a padding mangle; a hydro-extractor; a Psarski experimental dyeing machine, a Hussong experimental dyeing machine, equipped for raw stock or yarns, a Rodney Hunt sample piece dyeing machine, equipped with an automatic temperature and pressure-regulating apparatus, made by C. J. Tagliabue Manufacturing Company. The Franklin Process Company has furnished a 25-pound bronze dyeing machine.

Finishing Department.—The Woolen and Worsted section includes a motor-driven Clipper cloth 4-string washer, a fulling mill, and a combination fulling and washing mill for jersey fabrics, furnished by the Rodney Hunt Company; a sample fulling mill, a kicker mill, furnished by James Hunter & Company; an up and down dry gig, a rolling and stretching machine, an up and down wet gig, a steam finishing machine, a 60-inch, 3-burner singeing machine, adapted for cotton, silk or worsted goods, a 2-cylinder double-acting brushing machine. Curtis & Marble Machine Company has furnished a 60-inch 4-cylinder sanding and polishing machine; a mantle steaming and air cooling machine, equipped with a direct connected motor and a Nash pump; and a 66½-inch motor driven, single woolen shear, equipped with list saving motion; a 6-4 double shear, an A. W. C. measuring and weighing machine, furnished by Parks & Woolson; a dewing machine, a 6-4 Voelker rotary press, furnished by G. W. Voelker & Co.; a tentering and drying machine furnished by John Heathcote; a single crabbing machine, H. W. Butterworth & Son; a 72-inch woolen napper donated by Davis & Furber; a 32-inch basket hydro-extractor, W. H. Tolhurst; a Lintz & Eckhardt cloth numbering machine, from Durbrow & Hearne Company; a steam press for underwear, United States Hoffman Company; a sewing machine, Birch Brothers; a trimming and overseaming machine, The Merrow Machine Company.

The Cotton section includes a 40-inch inspecting and brushing machine, a 44-inch No. 25 railway sewing and rolling machine, a 44-inch cotton shearing machine, Type No. 34, a 44-inch No. 3 steam calender rolling machine, a 40-inch cloth folder, a 40-inch winder and measurer, a set of 44-inch shear blades for grinding purposes, furnished by Curtis & Marble Machine Company; a 48-inch No. 4 opening, sewing and rolling machine, a No. 1 hand power portable railway sewing machine, furnished by Dinsmore Manufacturing Company; a 40-inch 4-tank open soaping machine equipped with patent flushing rolls, brass and rubber squeeze rolls and spiral openers, furnished by Birch Brothers; an 80-inch 24-roll, ball bearing, double acting napper, equipped with a 7½-horsepower General Electric motor drive, furnished by Davis & Furber (the ball bearings were donated by the Fafnir Bearing Company); a 40-inch, 3-roll water mangle, with husk and brass rolls and usual attachments and equipped with a 48-inch Mycock scutcher, and a 40-inch Mycock cloth expander made by Thomas Leyland & Company; a 40-inch, 2-roll starch mangle, a 40-inch upright drying machine with 10 copper cylinders equipped with Files dry can system; a 40-inch sprinkler, a 40-inch, 5-roll Universal calender with chasing attachment and equipped with a 40-inch Mycock cloth expander, a pasting table with plate, furnished by the Textile-Finishing Machinery Company; a 16 by 24 inch bronze-covered stretcher for the drying cans, C. A. Luther & Company; a 40-inch double bristle stretcher for drying cans, American Finishing Machinery Company; a trimming and overseaming machine, The Merrow Machine Company; a 40-inch Tommy Dodd starch mangle, and a 44-inch, 50-foot vibratory tentering machine, H. W. Butterworth & Sons Company. This machine is directly driven by a 7½-horsepower variable speed motor and is equipped with a Schwartz automatic electric guider, made by L. H. A. Schwartz & Company.

Engineering Department.—The Steam Engineering Laboratory contains the following equipment arranged for experimental purposes: A 50-horsepower Allis-Chalmers Corliss steam engine direct connected to an Alden absorption dynamometer, and piped to exhaust its steam to the atmosphere, to a Wheeler surface condenser or to the Kerr turbine; a Kerr seven-stage turbine driving directly a 25-kilowatt Richmond Electric Company's alternating current generator and piped to exhaust either to the atmosphere or the condenser. It may be operated either as high pressure or low pressure turbine, and the generator has special connections to illustrate various commercial phases. In addition there are a 4 by 6

Deane triplex power pump, two 2-inch centrifugal pumps made by Lawrence Machine Company, Lawrence, Mass., a Clayton air compressor and necessary tanks, scales and measuring instruments.

The Electrical Engineering Laboratory consists of two sections, one of which is devoted to instruction in the generation and transmission of power, and contains the necessary switchboard and instruments to control a 25-kilowatt alternating current turbo generator and a 15-kilowatt motor generator set arranged to supply either direct or alternating current. In addition there are a 24-horsepower direct current Allis-Chalmers motor and a 10-horsepower direct current General Electric motor, also a 10 and a 7.5 horsepower General Electric alternating current motor besides a General Electric 3-kilowatt rotary transformer and three Westinghouse stationary transformers. The other section is the instrument laboratory and is for the purpose of giving instruction in the measurement of current, voltage, resistance, and in the calibration of instruments. It is supplied with standard alternating and direct current measuring instruments of a wide range of sizes and capacities. A 160 ampere hour storage battery offers a source of constant voltage. A standard Leeds & Northrup photometer with Lummer-Brodhun screen and Macbeth illuminometer provide means of illumination measurements.

Machine Shop.—The equipment of the machine shop is as follows: Four standard engine lathes, 13-inch swing, 6-foot bed, and an engine lathe, 18-inch swing, 10 foot bed; three standard engine lathes, 14-inch swing, 6-foot bed, from Flather & Company; a standard engine lathe, 15-inch swing, 6-foot bed, from F. E. Reed Company; an engine lathe, 18-inch swing, 6 foot bed from Champion Tool Works; a standard engine lathe, 15-inch swing, 6-foot bed, from S. H. Putnam Sons; one No. 1 Universal milling machine, with all three feeds automatic, from Kempsmith Manufacturing Company; one 24 by 24 inch, 6-foot planer, from the Mark Flather Planer Company; one 23-inch upright drill, with back gears and power feed, from J. E. Snyder & Son; one 14-inch single sensitive drill, from the Stanley Manufacturing Company; one No. 1 Universal grinder, from Landis Tool Company; five speed lathes, 17-inch swing, 5-foot bed, one 20-inch wet tool grinder, and one 12-inch, 2-wheel dry grinder, from J. G. Blount; an American twist drill grinder, from the Heald Machine Company; one Type 1B portable electric grinder from the Cincinnati Electric Tool Company; one 30-inch grindstone and frame, from the Athol Machine Company; a single spindle centering machine, from D. E. Whiton Machine Company; one 15-inch shaper, from Potter & Johnson; one power hacksaw, from the Fairbanks Company; one cold saw, from John T. Burr & Son; one Eureka metal power saw, Manning, Maxwell & Moore; one Type CC electric drill, Cincinnati Electric Tool Company; one Universal milling attachment for Kempsmith milling machine, and one Hisey Type B $\frac{1}{2}$ -horsepower tool post grinder, Taylor Machinery Company; one No. 2 Cory bench straightener, Manning, Maxwell & Moore; one No. 3 Universal cutter and reamer grinding machine, Browne & Sharpe; a well-equipped tool room containing a selected stock of the best makes of small tools, such as drills, taps and dies, milling cutters, reamers, gauges, micrometers, etc.

PRIZES AWARDED IN JUNE, 1944

The National Association of Cotton Manufacturers offers a medal to that member of the graduating class who maintains the highest standing throughout his course in Textile Engineering (General or Cotton Option) or the course in Cotton Manufacture. To *James Arthur McLean*.

The Proprietors of the Locks and Canals on the Merrimack River Scholarship at Massachusetts Institute of Technology. Several years ago the Proprietors of the Locks and Canals on the Merrimack River, a corporation owning the power rights on the Merrimack River in Lowell, gave to the Massachusetts Institute of Technology a sum of money to provide graduate scholarships to graduates from the Lowell Textile Institute who held a degree and were recommended by the trustees. Applicants must have maintained throughout their undergraduate courses a high scholastic record and must meet the requirements of the Graduate School of the Massachusetts Institute of Technology.

Louis A. Olney Book Prizes.—Prizes in the form of books are awarded each year to the successful candidate on graduation day. The conditions in detail are as follows:—

\$10 to the student graduating from the Chemistry and Textile Coloring course, who, not having already received recognition by appointment as an assistant instructor, shall have maintained the highest scholarship through the course. To *Joseph Bernard Massaschi*.

\$10 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship during his second year. To *Kenneth Harold Meister*.

\$5 to the regular student of the Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship during his second year. To *Eleanor Elizabeth Foley*.

\$10 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the highest scholarship in first-year Chemistry. To *Pauline Frances Riordan*.

\$5 to the student taking the regular Chemistry and Textile Coloring course who shall be considered as having attained the second highest scholarship in first-year Chemistry. To *John Joseph Bernard*.

STUDENT ACTIVITIES AND ORGANIZATIONS

School Publications.—The Text is issued bi-weekly and it contains news pertaining to activities in the Institute as well as information concerning alumni. The Pickout is an annual publication in charge of a manager and editor selected from the senior class. The board is composed of representatives from the various classes.

Societies.—There are four fraternities, three of which are national and one local, also one sorority. They afford opportunity for social life desired in a college career.

Dramatic Club.—The Dramatic Club gives a theatrical program annually. Appropriation is made from the profits to the treasury of the Athletic Association.

Professional Clubs.—The Textile Engineering Society is composed of all students registered in the Textile Engineering Course. The society holds meetings at which speakers are heard. The Student Chapter of the American Association of Textile Chemists and Colorists sponsors meetings addressed by speakers on technical subjects.

Rifle Club.—The rifle club offers opportunity to all students to attain proficiency in marksmanship and selects the team for interscholastic matches with other colleges.

Honor Society.—To degree candidates who have maintained a high scholarship for three years' work, or who have met with certain similar requirements, is accorded the honor of membership in the society Tau Epsilon Sigma. Relatively a membership in this society corresponds to that in some of the well-known honor societies of the liberal arts and scientific colleges. It requires constant attendance and application to the work of the course for any student to reach the scholarship level entitling him to this membership.

Honor Roll.—The President's List includes upper classmen taking a regular course who have a general average of eighty percent and no deficiencies.

Student Book Store.—A book store is operated on the cooperative plan by the Lowell Textile Associates, Inc., for the benefit and convenience of students who desire to purchase books, supplies, and other materials for use in connection with their work. It is conducted by a manager and two clerks, all of whom are undergraduates. The general business policy is under the control and supervision of a member of the Faculty. Any student may become an associate member of the Lowell Textile Associates, Inc., upon payment of the required fee and is thereby entitled to discount privileges when purchasing from the Book Store and from certain firms in the city of Lowell.

Alumni Association.—The Alumni Association of the Institute holds its annual meeting and banquet in May of each year.

The membership of the association is composed of graduates of the day courses and is open to any non-graduate who has attended the Institute for at least one year.

OFFICERS FOR THE YEAR 1944-45

Carl D. Brandt, '20, *President*
J. Milton Washburn, '21, *Vice-President*
A. Edwin Wells, '20, *Secretary-Treasurer*

Communications should be addressed to A. Edwin Wells, Lowell Textile Institute.

EXECUTIVE COMMITTEE

Roy H. Bradford, '06	Thomas Joy, '26
James F. Dewey, '04	Francis P. Madden, '13
Parker F. Dunlap, '34	Richard W. Rawlinson, '31
John G. Ehmalian, '16	Everett B. Rich, '11
Edwin D. Fowle, '24	Raymond R. Stevens, '19
Olin D. Gay, '08	Herbert W. Wilkinson, Jr. '37
Milton Hindle, '25	Harold E. Clayton, '21

TRUSTEES OF THE SCHOLARSHIP FUNDS

Carleton J. Lombard Albert J. Gilet

AUDITOR

Nathaniel E. Jones

GRADUATES OF 1944

MASTER OF SCIENCE IN TEXTILE CHEMISTRY

†GEORGE JOHN MANDIKOS
B.T.C. Lowell Textile Institute 1942

BACHELOR OF TEXTILE CHEMISTRY

GEORGE ALPERIN	†GEORGE FRANCIS RICHARDSON
JOHN ALLEN COLBURN	†WILLIAM JAMES SIDEBOTTOM
†JOSEPH BERNARD MASASCHI	†ERNEST MALCOLM STROMVALL, JR.
†CARMELO ROSARIO PULIAFICO	JOHN THOMAS WALWOOD

BACHELOR OF TEXTILE ENGINEERING

†VEE-BING DOO	MILTON J. JAY
MAURICIO ALEJANDRO ECHAVARRIA	†JAMES ARTHUR McLEAN
ECHAVARRIA	†VIRGINIA LOUISE NATH
†THEODORE FINE	†HELEN MARY O'LOUGHLIN
†MAURICE WILLIAM HARRISON	IRVING MANNY RABINOWITZ
DONALD CHESTER ROBERTS	

CANDIDATES FOR DIPLOMAS

IN WOOL MANUFACTURE

JULIO GARCIA PUIG

IN COTTON MANUFACTURE

PAULO MOURAO GUIMARAES

† Tau Epsilon Sigma (Textile Scholastic Society)

REGISTER OF DAY STUDENTS

GRADUATE STUDENTS

<i>Home Address</i>	<i>Lowell Address</i>
COHEN, ISAAC, VI, Istanbul, Turkey B.S., Robert College, 1942	43 Plymouth Street
CHIAO, LEIN HSIN, VI, Sian, Shensi, China B.S., National Central University, 1942	43 Plymouth Street
DUNN, ROBERT, VI, Chungking, China B.S., Chinese National Southwest Associated University, 1941	137 Riverside Street
GRIFFIN, ROGER CASTLE, JR., IV, Needham, Mass. B.T.C., Lowell Textile Institute, 1943	5 White Street
TU, TZY-JIN, VI, Chungking, China B.T.E., Nantung University, 1936	195 Nesmith Street

UNDERGRADUATE STUDENTS

CANDIDATES FOR DEGREES

Class of 1945

CHAMBERS, EDWARD FRANCIS, VI, Chelmsford, Mass.	_____
GOLDBERG, MELVIN DAVID, VI, Brookline, Mass.	392 Chelmsford Street
LINT, THEODORE MICHAEL, JR., VI, Lowell, Mass.	43 Plymouth Street
MARINOPOULOS, CHARLES, VI, Lowell, Mass.	234 Adams Street
MILGRIM, SIDNEY, IV, Brooklyn, N. Y.	392 Chelmsford Street
MIRANOWICZ, JOSEPH JOHN, IV, Lawrence, Mass.	_____
MOSS, WARREN DONALD, VI, New York, N. Y.	Y.M.C.A.
SCHWARTZ, JOSEPH MICHAEL, VI, Brooklyn, N. Y.	19 Mt. Hope Street
VARON, JOSEPH ESKENAZI, IV, Lima, Peru	9 White Street

Class of 1946

FOLEY, ELEANOR ELIZABETH, IV, Lowell, Mass.	120 Fulton Street
HAGGERTY, ISABEL FRANCIS, Lowell, Mass.	127 Fort Hill Avenue
LANDRY, RITA PEARL, IV, Lowell, Mass.	348 Hildreth Street
LOREDO, JESUS DE BLAS, VI, San Luis Potosi, Mexico	113 Beacon St., Boston
TAMASAUSKAS, ALBERT EDMUND, IV, Lowell, Mass.	574 Central Street

Class of 1947

ADAMOPOULOS, LEWIS, IV, Haverhill, Mass.	_____
BECHARD, ROBERT WILLIAM, IV, Tyngsboro, Mass.	_____
BERNARD, JOHN JOSEPH, IV, Lowell, Mass.	999 Moody Street
DIAMOND, KENNETH, VI, New York, N. Y.	11 White Street
GAULIN, BLANCHE ANNETTE, VI, Lowell, Mass.	429 Pawtucket Street
GLADE, NATHANIEL HENRY, IV, Fall River, Mass.	5 White Street
IVES, ESTELLE MARIE, IV, Tewksbury, Mass.	_____
LEVIN, MADELINE, IV, Lowell, Mass.	43 Ware Street
LEVY, LEONARD, VI, New York, N. Y.	43 Plymouth Street
LIMA, MANUEL FLORES, VI, Ciudad Mendoza, Mexico	137 Riverside Street
MACINTYRE, ROBERT GARDINER, VI, Lowell, Mass.	32 Berkeley Avenue
MERRILL, JOHN WALCOTT, IV, Tewksbury, Mass.	_____
NYSTROM, FREDERICK WALTER, VI, West Chelmsford, Mass.	_____

Home Address

PERRY, WALTER HOLDEN, IV, No. Andover, Mass.
 PORTER, ROBERT ELLIS, VI, Ware, Mass.
 RIORDAN, PAULINE FRANCES, IV, Lowell, Mass.
 SARGENT, ANN EILEEN, IV, Lowell, Mass.
 SEGALL, WILLIAM MARTIN, IV, Lowell, Mass.
 WILKINSON, MARY RUTH, IV, North Andover, Mass.
 YANES, ARTHUR SELIG, VI, Brookline, Mass.

Lowell Address

19 Mt. Hope Street
 21 Orchard Street
 24 Maude Street
 111 Luce Street
 Y.M.C.A.

Class of 1948

AMADO, LUCIANO SOLVEIRA, VI, Rio de Janeiro, Brazil	15 Douglas Road
BARDZIK, JOHN WALTER, IV, Dracut, Mass.	
BOULAY, ALICE ELIZABETH, VI, Dracut, Mass.	
BRAFF, STANFORD WILLIAM, VI, Brooklyn, N. Y.	43 Plymouth Street
BROSAN, MARTIN JOHN, VI, Lowell, Mass.	20 Genest Avenue
BROWN, RUSSELL LEE, JR., VI, Lowell, Mass.	59 Bradstreet Avenue
BURKE, PAUL RAYMOND, VI, Dracut, Mass.	
CALLAHAN, DANIEL FRANCIS, IV, Lowell, Mass.	26 Second Avenue
FIELD, LESLIE ADELBERT, JR., VI, Lowell, Mass.	230 Princeton Boulevard
HALLETT, RICHARD LIBBY, VI, Lowell, Mass.	98 Wannalancit Avenue
HARRISON, ROBERT ARTHUR, VI, Brookline, Mass.	21 Mt. Hope Street
HELLAND, HOWARD MANLEY, VI, Whitinsville, Mass.	11 White Street
HORWITZ, EDWARD MELVIN, VI, Utica, N. Y.	43 Plymouth Street
KAVOURAS, CHRISTOS NIKITAS, VI, Lowell, Mass.	5 Hancock Avenue
LEVIN, JORDAN, VI, Lowell, Mass.	141 East Merrimack Street
MAHONEY, HERBERT FRANCIS, IV, Winchester, Mass.	
MERRILL, RICHARD DOUGLAS, VI, Lowell, Mass.	364 Varnum Avenue
MORRIS, DONNA LOUISE, IV, Lowell, Mass.	40 Livingston Avenue
MURRAY, ARDELLE MAY, VI, Lowell, Mass.	1535 Middlesex Street
PIHL, DONALD GREENWOOD, VI, Lowell, Mass.	11 Stromquist Avenue
REYNOLDS, JAMES MICHAEL, IV, Lowell, Mass.	3 Concord Place
STILLMAN, EDWARD, VI, Shaker Heights, Ohio	32 Riverside Street

DIPLOMA STUDENTS**Class of 1945**

BAGGESEN, ALVAN FREDERICK, II, Concord, Mass.	
BOMBARA, FRANCIS JEROME, II, East Douglas, Mass.	28 Riverside Street

Class of 1946

NALBANDIAN, ARCHAVIR MELKONIAN, II, Santiago, Chile	9 White Street
URIARTE, IGNACIO, JR., I, Santiago, Chile	15 Douglas Road

Specials

DE MELLO, ROBERTO BRITO BEZERRA, I, Rio de Janeiro, D. F., Brazil	54 Pentucket Avenue
DE MENEZES, ANTONIO CARLOS A., I, Recife- Pernambuco, Brazil	
DA SILVA, JORGE BAPTISTA, I, Rio de Janeiro, Brazil	8 Mt. Washington Street
JAEGER, RANDOLPH FAIRFAX, III, No. Bergen, N. J.	8 Mt. Washington Street
SOTO, CECILIO HERNANDEZ, IV, Habana, Cuba	33 Burr't Street
YARNALL, JOHN JOSEPH, III, Methuen, Mass.	43 Plymouth Street

ALPHABETICAL LIST OF GRADUATES

Master of Science degree was first given in 1936. Other degrees were issued beginning with the year 1913 as follows: B.T.C.—Bachelor of Textile Chemistry; B.T.D.—Bachelor of Textile Dyeing; B.T.E.—Bachelor of Textile Engineering. A diploma is indicated by D and a certificate (covering a partial course only) by C.

The following list has been corrected in accordance with information received previous to February 1, 1945. Any information regarding incorrect or missing addresses is earnestly solicited.

A

- Abbot, Edward Moseley, II, '04 (D).**
President and General Manager, Abbot
Worsted Co., Graniteville, Mass.
- Abbott, George Richard, II, '08 (D).**
Tree Warden, Andover, Mass.
- Acar, Ibrahim Zeki, VI, '38 (M.S.).**
General Textile Engineer, Malatya Textile
Mills, Malatya, Turkey.
- Adams, Floyd Willington, VI, '16 (B.T.E.).**
- Adams, Henry Shaw, I, '05 (D).**
Assistant Treasurer, The Springs Cotton Mills,
Chester, S. C.
- Adams, Tracy Addison, IV, '11 (D).**
Consulting Engineer, Barnes Textile Associ-
ates, Inc., 10 High Street, Boston, Mass.
- Adie, Donald Miles, VI, '41 (B.T.E.).**
Ensign, USNR (Missing in action).
- Aigen, Lawrence, VI, '40 (B.T.E.).**
Lt., Army Air Force, Aircraft Maintenance.
- Albrecht, Charles Henry, IV, '17 (B.T.C.).**
Chief Chemist, Atlantic Mills, Providence, R. I.
- Alexander, Gerard, VI, '41 (B.T.E.).**
Lt., U. S. Marine Corps.
- Allard, Edward Joseph, IV, '31 (B.T.C.).**
With National Aniline Division, Allied Chem-
ical & Dye Corp., Providence, R. I.
- Allard, Ernest Herbert, IV, '43 (B.T.C.).**
Lt., U. S. Army.
- Allen, Grover Stanley, IV, '34 (B.T.C.).**
U. S. Army
- Almquist, George John Edwin, I, '19 (D).**
Second Vice-President, Passaic-Bergen Lum-
ber Company, Passaic, N. J.
- Alperin, George, IV, '44 (B.T.C.).**
Textile Chemist, Geigy Co., Inc., Boston, Mass.
- Anderson, Arthur Illman, IV, '24 (B.T.C.).**
Manager, New England Testing Laboratory,
12 Beacon St., Somerville, Mass.
- Anderson, Arthur Julius, IV, '19 (B.T.C.).**
Salesman, National Aniline Division, Allied
Chemical & Dye Corp., 40 Rector St., New
York, N. Y.
- Anderson, Clarence Alfred, VI, '25 (B.T.E.).**
Cost Accountant, Wanskuck Company, Providence, R. I.
- Anderson, Harold Robert, II, '26 (D).**
In Charge of Cost and Research Departments,
Abbot Worsted Company, Forge Village, Mass.
- Annan, David, II, '23 (D).**
- Anthony, Henry Steere, Jr., IV, '36 (B.T.C.).**
First Lieutenant, Chemical Warfare Service,
U. S. Army.
- Appel, Mrs. Bessie L. (Lifland, Bessie) IV, '32 (B.T.C.).**
Assistant Chemist, Massachusetts Knitting
Mill, Jamaica Plain, Mass.
- Arienti, Peter Joseph, IV, '10 (D).**
Chief Chemist and Superintendent of Dyeing,
Sayles Finishing Plants, Inc., Saylesville, R. I.
- Arundale, Henry Barnes, II, '07 (D).**
Assembler, Submarine Signal Company, 247
Atlantic Ave., Boston, Mass.
- Atwood, Henry Jones, II, '23 (D).**
Agent, Amos Abbott Company, Dexter, Me.

B

- Babb, Charles Wilkes, Jr., II, '31 (D).**
Superintendent, Knox Woolen Company,
Camden, Me.

- Babigan, Edward, IV, '33 (B.T.C.).**
With Outlet Fruit Company, Lowell, Mass.
- Babigan, Raymond, IV, '24 (B.T.C.).**
Examiner, U. S. Patent Office, Richmond, Va.
- Bacheider, Charles Edward, IV, '24 (B.T.C.).**
Superintendent of Acetate Yarn Division,
Tennessee Eastman Corporation, Kingsport,
Tenn.
- Baer, Leonard Herman, VI, '42 (B.T.E.).**
Captain, U. S. Army Air Corps.
- Bagshaw, Herbert Arthur Edward, VI, '32 (B.T.E.).**
Time Study Engineer, Pacific Mills, Lawrence,
Mass.
- Bailey, Lester Harold, IV, '24 (B.T.C.).**
Captain, Chemical Warfare Service. Overseas.
- Bailey, Walter James, IV, '11 (D).**
Owner, Bailey's Cleansers and Dyers, Inc.,
Watertown, Mass.
- Baker, Franz Evron, VI, '26 (B.T.E.).**
Mill Superintendent, Hampshire Woolen Co.,
Ware, Mass.
- Baker, Maurice Sidney, IV, '25 (B.T.C.).**
Merchant, Baker's Dress Goods Shop, Nor-
wood, Mass.
- Baker, Phyllis Jeanne, VI, '39 (B.T.E.).** (See
Copeland, Mrs. Charles).
- Baker, William John, IV, '16 (D).**
Manufacturing Superintendent, E. I. du Pont
de Nemours & Co., Old Hickory, Tenn.
- Balch, Ralph Herman, VI, '29 (B.T.E.).**
Development Engineer, Celanese Corporation
of America, Cumberland, Md.
- Baldwin, Frederick Albert, II, '04 (D).**
President, Federal Clothing Manufacturing
Company, Ltd., Sherbrooke, Que.
- Banta, John Garrett, VI, '39 (B.T.E.).**
Lieutenant, U. S. Naval Air Corps.
- Bard, Morry Arnold, IV, '30 (B.T.C.).**
Owner and Manager, Silver Line Dye Works,
Inc., New York City.
- Bardzik, Thaddeus, IV, '41 (B.T.C.).**
Chemist, Research & Development, Phila-
delphia Quartermaster Corps, Philadelphia, Pa.
- Barlofsky, Archie, VI, '17 (B.T.E.).**
Attorney at law, Barlofsky & Barlofsky,
Lowell, Mass.
- Barr, I. Walwin, I, '00 (D).**
Secretary, Buckley Brothers Company, Inc.,
881 Broadway, New York City.
- Barrett, Andrew Edward, IV, '23 (B.T.C.).**
Field Engineer, Armour & Co., North Bergen,
N. J.
- Barry, Leo Joseph, II, '27 (D).**
With Bell Company, Worcester, Mass.
- Barry, Marie Gertrude, IV, '32 (B.T.C.).**
See Bresnahan, Mrs. Bernard J., Jr.
- Basdikis, Charles Apostolos, IV, '36 (B.T.C.).**
Electrical Designer, Stone & Webster Engi-
neering Corporation, Boston, Mass.
- Bassett, Louis Loss, VI, '37 (B.T.E.).**
Ensign, USNR, Southwest Pacific.
- Basterrechea, Juan de, IV, '43 (B.T.C.).**
Havana, Cuba—Lamparilla No. 1.
- Batcheller, Ben Pitman, VI, '41 (B.T.E.).**
Second Lieutenant, Army Air Force. Overseas.
- Bates, Wesley Elliott, VI, '36 (B.T.E.).**
Supervisor, American Bosch Corporation,
Springfield, Mass.
- Bauer, Frank Norbert, I, '39 (D).**
Superintendent, Bauer's Ltd., Waterloo, Ont.
- Bauer, Harold Conrad, III, '28 (D).**
Army Air Base, Maxton, N. C.

- Beattie, John Silas, IV, '35 (B.T.C.).**
Chemist, American Viscose Corporation,
Marcus Hook, Pa.
- Beauregard, Albert Joseph, VI, '39 (B.T.E.).**
Engineer Draftsman, Grumman Aircraft Engineering Corp., Bethpage, L. I.
- Beck, Frederic Christian, II, '24 (D).**
In business. Weld & Beck, Southbridge, Mass.
- Beeman, Earl Royal, VI, '30 (B.T.E.).**
Lieutenant (j.g.), B.O.Q. Naval Mine Depot,
Yorktown, Va.
- Beigbader, Edgar Raymond, IV, '34 (B.T.C.).**
Colorist, National Aniline Division, Allied
Chemical & Dye Corporation, Buffalo, N. Y.
- Bell, Edward Benjamin, IV, '24 (B.T.C.).**
Chemist, Calgon, Inc., Lowell, Mass.
- Beltrami, Kenneth Charles, VI, '40 (B.T.E.).**
Assistant Superintendent, Madison Woolen
Company, Madison, Me.
- Bennett, E. Howard, II, '03 (C).**
Publisher, American Wool and Cotton Reporter,
330 Atlantic Avenue, Boston, Mass.
- Bentley, Byron, II, '26 (D).**
General Manager, Joseph Bentley Hair Company,
Methuen, Mass.
- Bergeron, Alvin Wilfred, IV, '29 (B.T.C.).**
Chemist, Celanese Corporation of America,
Ammelle, Md.
- Berry, Wilbur French, II, '17 (D).**
- Bertrand, Arthur Leon, IV, '32 (B.T.C.).**
Corporal, Radio Technician, U. S. Army Air
Corps. Overseas.
- Bethel, Ion Maywood, VI, '39 (M.S.) (B.S.,
Texas Agricultural and Mechanical College, 1925).**
Lieutenant Colonel, U. S. Marine Corps, c/o
Fleet Post Office, San Francisco, Calif.
- Beuter, Ralph Julius, VI, '43 (B.T.E.).**
Lieutenant, U. S. Army Air Corps.
- Bienstock, George Jerrard, III, '24 (D).**
51 Madison Avenue, New York, N. Y. Stylist,
Wm. V. Siegel Company, Selling Agent for
George Mabbett & Sons Company of Plymouth,
Mass. and Shetucket Worsted Mills of Baltic,
Conn.
- Billings, Borden Dickinson, I, '29 (D).**
- Bird, Clarence Henry, II, '22 (D).**
Superintendent, Cocheco Woolen Manufacturing
Company, East Rochester, N. H.
- Bird, Francis John, VI, '22 (B.T.E.).**
Attorney-at-Law, 227 Bronson Building,
Attleboro, Mass.
- Birtwell, John Lincoln, IV, '34 (B.T.C.).**
Staff Sergeant, 19th Weather Squadron, U. S.
Air Corps, Overseas.
- Blaikie, Howard Mills, II, '11 (D).**
- Blake, Parker Gould, VI, '14 (D).**
Salesman, G. Whitaker & Co., Ltd., Peter-
borough, Ont.
- Blanchard, Armand Eugene, III, '41 (D).**
Lieutenant, U. S. Army Ordnance Depot, c/o
P.M., New York, N. Y.
- Blanchard, John Lawrence, II, '23 (D).**
- Bogdan, John Francis, VI, '35 (B.T.E.).**
Overseer, Manville Jenckes Corporation,
Manville, R. I.
- Bone, Arthur Peter Stuart, VI, '39 (B.T.E.).**
Lieutenant (j.g.), USNR, c/o Fleet Post Office,
San Francisco, Calif.
- Booth, James Mooney, IV, '24 (B.T.C.).**
Assistant Sales Manager, The Huron Milling
Company, 9 Park Place, New York City.
- Bordett, Sidney Morris, VI, '37 (B.T.E.).**
Pfc., U. S. Army Air Force—Signal Corps.
- Bottomley, John, III, '28 (D).**
Assistant Technician, Joshua L. Bailey & Co.,
40 Worth Street, New York City.
- Boule, George Raymond, IV, '42 (B.T.C.).**
Lieutenant (j.g.) USNR.
- Boyd, William, Jr., IV, '40 (B.T.C.).**
Lieutenant (j.g.), USNR, c/o Fleet Post Office,
New York, N. Y.
- Boynton, Bradford Lewis, II, '35 (D).**
First Lieutenant, U. S. Army. Overseas.
- Bradford, Edward Hosmer, VI, '35 (B.T.E.).**
Assistant Overseer of Carding, Manville-
Jenckes Corporation, Manville, R. I.
- Bradford, Harold Palmer, II, '25 (D).**
- Bradford, Roy Hosmer, II, '06 (D).**
Appraiser, Reconstruction Finance Corpora-
tion, 10 P. O. Square, Boston, Mass.
- Bradford, William Swanton, VI, '31 (B.T.E.).**
Commissioner of Conciliation, U. S. Depart-
ment of Labor, Washington, D. C.
- Bradley, Raymond Frost, VI, '14 (D).**
Garage Proprietor, Twin Light Garage, 267
East Main Street, Gloucester, Mass.
- Bradley, Richard Henry, V, '01 (C).**
Gasoline Salesman, Fairhaven, Mass.
- Brainerd, Arthur Travena, IV, '09 (D).**
Manager, Ciba Company, Inc., 325 West
Huron Street, Chicago, Ill.
- Brainerd, Carl Emil, IV, '20 (B.T.C.).**
Dyer, F. C. Huyck & Sons, Albany, N. Y.
- Brandt, Carl Dewey, VI, '20 (B.T.E.).**
Director of Research, Whitin Machine Works,
Whitinsville, Mass.
- Brannan, Leon Vincent, III, '07 (C).**
- Brantman, Jackson Agmor, VI, '39 (B.T.E.).**
First Lieutenant, U. S. Army. c/o Postmaster,
New York, N. Y.
- Bresnahan, Mrs. Bernard J., Jr. (Marie G.
Barry) IV, '32 (B.T.C.).**
332 Wentworth Avenue, Lowell, Mass.
- Brickett, Raymond Calvin, II, '14 (D).**
Overseer, M. T. Stevens & Sons Company
(Marland Mills), Andover, Mass.
- Bridges, Herbert Gardner, II, '34 (D).**
Representative, The New Hampshire Com-
pany, Manchester, N. H.
- Brigham, Howard Mason, VI, '24 (B.T.E.).**
Sales and Manufacturing Executive, Well-
ington, Sears Co., 65 Worth Street, New York
City.
- Brilliant, Ira Francis, IV, '43 (B.T.C.).**
U. S. Army.
- Broadhurst, Russell Denton, IV, '38 (B.T.C.).**
Chief Dyer, Russell Manufacturing Co., Mid-
dletown, Conn.
- Bronson, Howard Seymour, II, '27 (D).**
Overseer of Knitting, Portage Hosiery Com-
pany, Portage, Wis.
- Brook, George Henry, II, '42 (D).**
Assistant Manager, Brook Woolen Company,
Simcoe, Ont.
- Brook, John Frederick, VI, '42 (B.T.E.).**
Captain, Royal Canadian Artillery.
- Brooks, Raymond King, Jr., VI, '41 (B.T.E.).**
Foreman, Chas. W. House & Sons, Inc., Union-
ville, Conn.
- Brosnan, William Francis, IV, '27 (B.T.C.).**
Director, Dyeing and Finishing Operations,
Verney Mills, Boston 16, Mass.
- Brown, Gerald Marston, VI, '22 (B.T.E.).**
Superintendent, Worsted Top and Yarn Divi-
sion, Botany Worsted Mills, Passaic, N. J.
- Brown, Needham Ballou, Jr., VI, '41 (B.T.E.).**
Assistant Superintendent, Cowan Mill, Lewiston,
Me.
- Brown, Philip Franklin, II, '23 (D).**
Assistant Sales Director, E. I. du Pont de
Nemours, Rayon Division, Wilmington, Del.
- Brown, Rollins Goldthwaite, IV, '12 (D).**
New York Representative, Saco-Lowell Shops,
Biddeford, Me.
- Brown, Russell Lee, VI, '21 (B.T.E.). '40 (M.S.).**
Professor of Textiles; in charge Department of
Woolen Yarns, Lowell Textile Institute, Lowell,
Mass.
- Brown, Will George, Jr., IV, '22 (B.T.C.).**
Salesman, Textile Aniline & Chemical Com-
pany, Lawrence, Mass.
- Buchan, Donald Cameron, II, '01 (D).**
Superintendent, M. T. Stevens & Sons Com-
pany, North Andover, Mass.
- Buchan, Norman Spaulding, IV, '26 (B.T.C.).**
Textile Chemist, Newmarket Manufacturing
Company, Lowell, Mass.
- Buck, Roy Garvin, Lt. Comdr. (S.C.) U.S.N.,
VI, '41 (M.S.). (B.S., 1933, U. S. Naval
Academy.)**
Officer in Charge of Purchase, Research and
Control Sections, Navy Department, Wash.,
D. C.
- Buckley, Herman Timothy, IV, '39 (B.T.C.).**
Pfc., U. S. Army.
- Bukala, Mitchell John, IV, '34 (B.T.C.).**
Chemist, Massachusetts Mohair Plush Com-
pany, Lowell, Mass.
- Bullock, Merlen Clarke, VI, '40 (B.T.E.).**
Textile Engineer, B. F. Goodrich Co., Akron,
Ohio.

- Bullock, Ralph Louis, IV, '43 (B.T.C.).**
U. S. Army. Overseas.
- Bulson, Douglas Whitney, VI, '42 (B.T.E.).**
Mechanical Engineer, U. S. Rubber Co., Woonsocket, R. I.
- Burbeck, Dorothy Maria, IV, '20 (B.T.C.).**
See Garlick, Mrs. Dorothy M.
- Burger, Samuel Joseph, III, '24 (D).**
Textile Engineer & Consultant, 60 John Street, New York, N. Y.
- Burke, James Edward, Jr., IV, '34 (B.T.C.).**
Police Officer, Lowell Police Department, Lowell, Mass.
- Burnham, Frank Erwin, IV, '02 (D).**
- Burns, Robert, IV, '28 (B.T.C.).**
Technician, Celanese Corporation of America, 180 Madison Avenue, New York 16, N. Y.
- Burt, Joseph Frederic, VI, '31 (B.T.E.).**
Assistant to Superintendent, Abbot Worsted Company, Forge Village, Mass.
- Buzzell, Harry Saville, VI, '29 (B.T.E.).**
Supervisor, Oxford Paper Company, Rumford, Maine.
- C
- Caine, Philip Daniel, IV, '42 (B.T.C.).**
Lieutenant U. S. Naval Reserve.
- Calder, Marian Brownson, VI, '37 (M.S.).**
See Sigel, Mrs. A. E.
- Callahan, John Joseph, Jr., II, '26 (D).**
- Cameron, Elliott Francis, IV, '11 (D).**
Lawyer, Willard, Allen and Mulkern, 100 Milk Street, Boston, Mass.
- Campbell, Alexander, VI, '23 (B.T.E.).**
Plant Engineer, Arlington Mills, Lawrence, Mass.
- Campbell, Allan, Jr., VI, '32 (B.T.E.).**
Contractor, A. & A. Campbell, South Boston, Mass.
- Campbell, Andrew Morris, IV, '40 (B.T.C.).**
Radar Man, U. S. Coast Guard.
- Campbell, Louise Porter, IIb, '03 (C).**
With Ginn & Co., Boston, Mass.
- Campbell, Orison Sargent, II, '03 (D).**
Felt Salesman, E. F. Walters Co., Reg'd., Toronto, Ont.
- Canell, Philip Stuart, VI, '23 (B.T.E.).**
Hotel Proprietor, Carlton Hotel, Malden, Mass.
- Carbone, Alfred John, IV, '31 (B.T.C.).**
Chemist and Colorist, Sandoz Chemical Works, Philadelphia, Pa.
- Carleton, Joseph Raddin, III, '30 (D).**
Manager, Defense Division, Bridgeport Fabrics, Inc., Bridgeport, Conn.
- Carmichael, Robert Dana, VI, '42 (B.T.E.).**
Mechanical Engineer, U. S. Rubber Co., Naugatuck Conn.
- Carr, Paul Edward, II, '24 (D).**
Assistant General Manager, L. C. Chase & Co., Inc., 295 Fifth Avenue, New York City.
- Carter, Mrs. Dorothy E. (Lewis, Dorothy E.) VI, '41 (B.T.E.).**
324 North Main St., Woonsocket, R. I.
- Carter, Russell Albert, II, '25 (D).**
Head of Cost Department, W. S. Libbey Company, Lewiston, Me.
- Cary, Julian Clinton, VI, '10 (D).**
Resident Secretary, The American Mutual Liability Insurance Company, 15 Lewis Street, Hartford, Conn.
- Casey, Francis Harold, IV, '31 (B.T.C.).**
Salesman & Demonstrator, Sandoz Chemical Works, Inc., Boston, Mass.
- Caya, Ferdinand Joseph, IV, '22 (B.T.C.).**
Superintendent, Falls Yarn Mills, Woonsocket, R. I.
- Chace, William George, IV, '42 (M.S.). (Ph.B., Brown University, 1926).**
Lieutenant (j.g.) USNR.
- Chamberlin, Frederick Ellery, I, '03 (D).**
Overseer of Spinning, Monument Mills, Housatonic, Mass.
- Chandler, Proctor, IV, '11 (D).**
With Packard Mills of Webster, at Caryville, Mass.
- Chang, Chi, VI, '23 (B.T.E.).**
- Chang, Wen Chuan, VI, '21 (B.T.E.).**
Technical Expert, National Resources, Commission of Chinese Government, 111 Broadway, Room 515, New York 6, N. Y.
- Chapman, Mrs. Boyd P., Jr. (O'Donoghue, Eileen Margaret) VI, '39 (B.T.E.).**
- Chapman, Leland Hildreth, VI, '24 (B.T.E.).**
Director of Guidance and Teacher of Mathematics, School Department, Hingham, Mass.
- Chen, Shih Ching, IV, '22 (B.T.C.).**
- Chen, Wen-Pei, IV, '24 (B.T.C.).**
Chen-Fu Cotton Mill, Shanghai, China.
- Church, Charles Royal, II, '06 (C).**
Box 351, Lemon Grove, Calif.
- Clark, Earl William, IV, '18 (B.T.C.).**
Research Chemist, National Aniline Division, Allied Chemical and Dye Corporation, Buffalo 10, N. Y.
- Clark, Thomas Talbot, II, '10 (D).**
President and Treasurer, Talbot Mills, Inc., North Billerica, Mass.
- Clarke, George Dean, II, '21 (C).**
- Clayton, Harold Edmund, VI, '21 (B.T.E.).**
Treasurer and Manager, Clayton Hosiery Mills, Inc., Lowell, Mass.
- Cleary, Charles Joseph, II, '13 (D).**
Principal Materials Engineer, United States Army Air Corps, Dayton, Ohio.
- Clement, David Scott, IV, '24 (B.T.C.).**
Overseer of Dyeing, Nashua Manufacturing Company, Nashua, N. H.
- Cleveland, Richard Sumner, VI, '30 (B.T.E.).**
Lieutenant Colonel, U. S. Army, Office of the Quartermaster General, Washington, D. C.
- Clifford, Albert Chester, VI, '22 (B.T.E.).**
Textile Engineer, Western Electric Company, Inc., Kearny, N. J.
- Clogston, Raymond B., IV, '04 (D).**
Division Superintendent, Merrimack Manufacturing Company, Lowell, Mass.
- Cluett, John Girvin, I, '29 (D).**
Acting Superintendent, Cluett, Peabody & Co., Inc., Troy, N. Y.
- Coan, Charles Bisbee, IV, '12 (D).**
Salesman and Demonstrator, American Aniline Products Company, Boston, Mass.
- Cobb, Joseph Calvin, VI, '36 (B.T.E.).**
General Manager, Middlesex Paper Tube Company of Maine, Augusta, Maine.
- Cobin, Arthur Edward, IV, '23 (B.T.C.).**
President, National Hosiery Dyeing and Finishing Works, Inc., Boston, Mass.
- Coffey, Daniel Joseph, III, '28 (D).**
Blanket Superintendent, F. C. Huyck & Sons, Rensselaer, N. Y.
- Coffin, William Burton, IV, '42 (B.T.C.).**
With National Aniline Division, Allied Chemical & Dye Corporation, Buffalo, N. Y.
- Cohen, Leonard Lee, II, '39 (D).**
Foreman, Yarn Control, S. Stroock & Co., Newburgh, N. Y.
- Cohen, Raphael Edvab, IV, '25 (B.T.C.).**
Sales Manager, Merrimack Paper Tube Company, Inc., Lowell, Mass.
- Colburn, John Allen, IV, '44 (B.T.C.).**
U. S. Army.
- Colby, J. Tracy, VI, '16 (D).**
Sales Manager, F. C. Huyck & Sons, Albany, N. Y.
- Colby, Vernon Warren, IV, '40 (B.T.C.).**
U. S. Army.
- Colby, Willard Alvah, Jr., IV, '30 (B.T.C.).**
Southeastern Representative, Emery Industries, Inc., Cincinnati, Ohio.
- Cole, Edward Earle, IV, '06 (D).**
Manager, Haverhill Credit Bureau, Haverhill, Mass.
- Collonan, Herbert Joseph, II, '22 (D).**
With Potter & Collonan, Moosup, Conn.
- Coman, James Groesbeck, I, '07 (D).**
General Manager, Mexia Textile Mills, Mexia, Texas.
- Conant, Harold Wright, I, '09 (D).**
Treasurer, United Elastic Corporation, Easthampton, Mass.
- Conant, Richard Goldsmith, I, '12 (D).**
Sales Executive and Vice-President, Wellington, Sears Company, 65 Worth Street, New York City.

- Condon, John Andrew, Jr., IV, '41 (B.T.C.).
Second Lieutenant, U. S. Air Corps.
- Conklin, Jennie Grace, IIIb, '05 (C).
See Nostrand, Mrs. William L.
- Connolly, Daniel Francis, Jr., VI, '35 (B.T.E.).
U. S. Inspector of Textiles, Quartermaster Department, Boston, Mass.
- Connor, Thomas Francis, II, '28 (D).
Court Officer, Superior Court, Suffolk County, Boston, Mass.
- Connorton, John Joseph, III, '27 (D).
Lieutenant, Chemical Warfare Service, U. S. Army.
- Cook, Kenneth Bartlett, I, '13 (D).
Vice-President in Charge of Manufacturing, Manville-Jenckes Company, Manville, R. I.
- Cooper, Harlan Cyril, VI, '41 (M.S.). (B.S. 1931, U. S. Naval Academy.)
Capt, Asst. O. I. C. Testing Laboratory, U. S. Marine Corps Depot, Philadelphia, Pa.
- Copeland, Mrs. Phyllis B. (Baker, Phyllis Jeanne) VI, '39 (B.T.E.).
Technician, Laboratory Division of Warwick Mills, Boston, Mass.
- Corbett, James Francis, IV, '28 (B.T.C.).
Chemist, Technical Control Department, Pacific Mills, 214 Church Street, New York, N. Y.
- Corcoran, Leonard Robert, IV, '42 (B.T.C.).
T/S, U. S. Army, Quartermaster Corps, c/o Postmaster, San Francisco, Calif.
- Cote, Theodore Charles, IV, '26 (B.T.C.).
Captain, Medical Administration Corps, U. S. Army.
- Coulman, Malcolm Prescott, IV, '43 (B.T.C.).
Lieutenant, U. S. Army Air Corps. Prisoner of War in Germany.
- Cowan, Raymond Bernard, IV, '35 (B.T.C.).
Owner, Cowan & Shain, Haverhill, Mass.
- Craig, Albert Wood, IV, '07 (D).
Manager, Windsor Print Works, North Adams, Mass.
- Craig, Clarence Eugene, III, '02 (D).
1730 Centre Street, West Roxbury, Mass.
- Crane, Eugene Francis, II, '33 (D).
With East Weymouth Wool Scouring Company, East Weymouth, Mass.
- Crawford, Robert Thomas, VI, '36 (B.T.E.).
Assistant Superintendent, Acetate Staples Department, Tennessee Eastman Corporation, Kingsport, Tenn.
- Creese, Guy Talbot, IV, '14 (D).
General Manager, Creese & Cook Company, Danversport, Mass.
- Crowe, Joseph Bailey, IV, '25 (B.T.C.).
Director of Laundry and Textile Research, Proctor & Gamble Co., Ivorydale, Ohio.
- Culver, Ralph Farnsworth, IV, '04 (D).
Manager and Director, Providence Office, Ciba Company, Inc., 61 Peck Street, Providence, R. I.
- Cummings, Edward Stanton, VI, '16 (D).
Industrial Engineer, Ralph E. Loper Company, Greenville, S. C.
- Curran, Charles Ernest, III, '02 (C).
Head Designer, Wood Worsted Mills, Lawrence, Mass.
- Currier, John Alva, II, '01 (D).
Mechanical Superintendent, M. T. Stevens & Sons Co., North Andover, Mass.
- Curtin, William John, IV, '35 (B.T.C.).
Textile Chemist, Naugatuck Chemical Division of U. S. Rubber Company, Naugatuck, Conn.
- Curtis, Frank Mitchell, I, '06 (D).
19A Forest Street, Cambridge, 40, Mass.
- Curtis, William Leavitt, II, '05 (C).
- Cutler, Benjamin Winthrop, Jr., III, '04 (D).
- D
- Daley, Charles Lincoln, IV, '34 (B.T.C.).
Instructor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.
- Dalton, Gregory Smith, IV, '12 (D).
- Daly, William James, VI, '37 (B.T.E.).
Inspector of Textiles, Boston Quartermaster Depot, Boston, Mass.
- Darby, Avard Nelson, II, '28 (D).
Manager, Merrimac Hat Corporation, Greenville Division, Greenville, Ala.
- Datar, Anant Vithal, VI, '24 (B.T.E.).
Managing Director, Venkatesh Rang Tantum Mills, Inchalkaranji, S. M. Cy., India.
- Davidson, Sydney, III, '28 (D).
- Davieau, Alfred Edward, VI, '16 (D).
Manager, Engineering and Research Division, United States Testing Company, Inc., 1415 Park Avenue, Hoboken, N. J.
- Davieau, Leon Arthur, VI, '23 (B.T.E.).
Textile Engineer, United States Rubber Company, Passaic, N. J.
- Davis, Alexander Duncan, VI, '14 (B.T.E.).
Instructor, Northeastern University, Springfield, Mass.
- Davis, Arthur Sabin, IV, '40 (B.T.C.).
Lieutenant (j.g.), U. S. Navy Air Corps.
- Davis, Esther Alice, IV, '43 (B.T.C.).
With U. S. Rubber Company, Lowell, Mass.
- Dearborn, Roy S., VI, '13 (D).
- Del Plaine, Parker Haywood, IV, '25 (B.T.C.).
Southern Manager, Rohm & Hass Company, Inc., 1109 Independent Building, Charlotte, N. C.
- DeMallie, Peter, IV, '43 (B.T.C.).
Lieutenant (j.g.), USNR. Aerologist, N.A.S., Squantum, Mass.
- Dempsey, Philip Edward, IV, '33 (B.T.C.).
Captain, 470th A.A.F. Base Unit Engineer Camouflage School, A.V.N., Riverside, Calif.
- Derby, Roland Everett, IV, '22 (B.T.C.).
Proprietor, The Derby Company, Lawrence, Mass.
- Derzawetz, Joseph, VI, '39 (B.T.E.).
U. S. Naval Reserve. Overseas.
- de Sa, Francisco, VI, '18 (B.T.E.).
Avenue de Graca, Bahia, Brazil.
- Dewey, James French, II, '04 (D). (M.S. 1932, Norwich University.)
Woolen Manufacturer, A. G. Dewey Company, Quebec, Vt.
- Dewey, Maurice William, II, '11 (D).
- Dick, Henry Kendal, Jr., VI, '39 (B.T.E.).
Lieutenant, U. S. Navy, Det. 10th Weather Squadron. Overseas.
- Dillon, James Henry, III, '05 (D).
- Dion, Ernest Lorenzo, IV, '35 (B.T.C.).
Chemist, Zinsser & Company, Hastings-on-Hudson, N. Y.
- Dods, James Barber, II, '27 (D).
Vice-President, The Dods Knitting Company, Ltd., Orangeville, Ont.
- Donald, Albert Edward, II, '04 (D).
Manager, Franklin Yarn Co., Franklin, Mass.
- Donohoe, Edward Joseph, VI, '34 (B.T.E.).
Manager, United States Testing Company, Inc., 601 W. Susquehanna Avenue, Philadelphia 22, Pa.
- Donovan, Joseph Richard, IV, '24 (B.T.C.).
- Doo, Vee Bing, VI, '44 (B.T.E.).
Engineer, Wah Chang Trading Corporation, 233 Broadway, New York, N. Y.
- Doran, Wilbur Kirkland, II, '22 (D).
Real Estate and Insurance, W. K. Doran Agency, Bristol, N. H.
- Dorr, Clinton Lamont, VI, '14 (D).
General Manager, Raymond's, Inc., 356 Washington Street, Boston, Mass.
- Douglas, Walter Shelton, II, '21 (D).
Roofing Contractor, Douglas & Co., Lowell, Mass.
- Ducley, Albert Richard, VI, '33 (B.T.E.).
Chicopee Manufacturing Corporation, Chicopee Falls, Mass.
- Duggan, Paul Curran, IV, '31 (B.T.C.).
Lieutenant (j.g.), USNR, c/o Fleet Post Office, San Francisco, Calif.
- Duguid, Harry Wyatt, I, '24 (D).
Assistant Treasurer, Maverick Mills, East Boston 28, Mass.
- Dunlap, Kirke Harold, Jr., VI, '30 (B.T.E.).
Superintendent, Kenwood Mills, Ltd., Arrprior, Ont.
- Dunlap, Parker Frank, VI, '34 (B.T.E.).
Textile Engineer, Chicopee Manufacturing Corporation, Manchester, N. H.
- Dunnican, Edward Tunis, VI, '24 (B.T.E.).
Instructor in Textile Shop Practice, Wilson Junior High School, Passaic, N. J.

- Durgin, William Ernest, IV, '24 (B.T.C.).**
Textile Chemist, Geigy Company, Inc., 88
Broad Street, Boston, Mass.
- Dursin, Louis Jules, II, '36 (D).**
Superintendent and Personnel Manager,
Rochambeau Worsted Company, Providence,
R. I.
- Duval, Joseph Edward, II, '10 (D).**
Executive Vice-President, Massachusetts Mo-
hair Plush Company, 3701 North Broad Street,
Philadelphia, Pa.
- Dwight, John Francis, Jr., II, '08 (D).**
Hazel Avenue, Scituate, Mass.

E

- Echavarria, Luis, VI, '35 (B.T.E.).**
With Fabrica de Hilados y Tejidos del Hato,
Medellin, Colombia.
- Echavarria, Mauricio Alejandro, VI, '44 (B.T.E.).**
Rijcs de Pablo Echavarria, Medellin, Colombia
- Echecopar, Jesus Fortunato, VI, '33 (B.T.E.).**
Director-Gerente de Eguren, Echecopar y Cia.
S.A. and Professor de Tecnologia Textil en Ia
Escuela de Ingenieros, Lima, Peru.
- Echmalian, John Gregory, VI, '16 (B.T.E.).**
Director, Connecticut State Department of
Education, Manchester, Conn.
- Ehrenfried, Jacob Benjamin, II, '07 (C).**
Area Director, War Manpower Commission
Lewiston, Maine.
- Eichner, Albert David, VI, '42 (B.T.E.).**
Corporal, U. S. Army, Bomb Squadron.
- Eismann, Edmund, IV, '35 (B.T.C.).**
Staff Sergeant, U. S. Army, Medical Detach-
ment, Orlando Air Base, Orlando, Fla.
- Eksstrand, Frederic Lawrence, II, '39 (D).**
Director of Sales, Textile Research Engineer,
Borne Strymser Company, Elizabeth, N. J.
- Elliot, Gordon Baylies, II, '12 (D).**
Industrial Engineering, Barnes Textile Asso-
ciates, Inc., Boston, Mass.
- Ellis, Charles Albert, VI, '21 (B.T.E.).**
Mechanical Engineer, Scott & Williams, Inc.,
Laconia, N. H.
- Ellis, Dorothy Myrta, VI, '25 (B.T.E.).**
Economist, War Production Board, Washing-
ton 25, D. C.
- Ellis, James Oliver, VI, '29 (B.T.E.).**
With Manville Jencks Corporation, Manville,
R. I.
- Engstrom, Karl Emil, VI, '12 (D). (S.B. 1916,**
Massachusetts Institute of Technology).
18 St. Luke Road, Allston, Mass.
- Enloe, Winfred Paige, I, '22 (D).**
Agent, W. A. Handley Manufacturing Com-
pany, Roanoke, Ala.
- Epstein, Edward Joseph, IV, '41 (B.T.C.).**
Lieutenant (j.g.), USNR.
- Esiellonis, Victor John, I, '39 (D).**
Shirley, Mass.
- Evans, Alfred Whitney, III, '03 (D).**
Apt. 3, Hanson Apartments, Rochester, N. H.
- Evans, Paul Richard, II, '29 (D).**
Assistant Sales Manager, Economics Labo-
ratory, Inc., St. Paul, Minn.
- Evans, William Robinson, III, '03 (D).**
309 Main Street, Bradford, Mass.
- Everett, Charles Arthur, IV, '19 (B.T.C.).**
Instructor, Dyeing Department, Lowell Textile
Institute, Lowell, Mass.

F

- Factor, Sidney Wilfred, IV, '41 (B.T.C.).**
49 Pleasant Street, Haverhill, Mass.
- Fairbanks, Almonte Harrison, II, '09 (D).**
- Fairbanks, Evans Hobbs, VI, '35 (B.T.E.).**
Manufacturing Methods Engineer, General
Electric Company, West Lynn, Mass.
- Falk, Stanley, VI, '40 (B.T.E.).**
Ensign, USNR Repair Unit, c/o Fleet Post
Office, San Francisco, Calif.
- Farkas, Zoltan Roland, IV, '35 (B.T.C.).**
Research Chemist, Morton Chemical Com-
pany, Greensboro, N. C.
- Farley, Clifford Albert, VI, '28 (B.T.E.).**
Physical Testing Laboratory, F. C. Huyck &
Sons, Rensselaer, N. Y.

- Farmer, Chester Jefferson, IV, '07 (D). (Ph.D.**
Harvard University.)
Professor of Chemistry, Northwestern Uni-
versity Medical School, Chicago, Ill.
- Farnsworth, Harold Vincen*, VI, '16 (B.T.E.).**
Trustee, Atkinson, Haserick & Co., 211 Con-
gress Street, Boston, Mass.
- Farr, Leonard Schaefer, II, '08 (D).**
With A. D. Ellis Mills, Inc., Monson, Mass.
- Farwell, Claude Chapman, VI, '23 (B.T.E.).**
Radio, Farwell Radio & Television Laboratory,
Groton, Mass.
- Fasig, Paul Leon, IV, '28 (B.T.C.).**
Chemist, American Chain & Cable Co., Read-
ing, Pa.
- Fead, Robert William, II, '41 (D).**
First Lieutenant, U. S. Army Air Corps. Over-
seas.
- Feinberg, Benjamin, II, '27 (D).**
- Feindel, George Paul, IV, '24 (B.T.C.).**
Chief Chemist, Rock Hill Printing & Finishing
Company, Rock Hill, S. C.
- Feldstein, Martin Alexander, VI, '24 (B.T.E.).**
With American Appliance Co., Albany, N. Y.
- Ferguson, Thomas Dickson, VI, '32 (B.T.E.).**
101 W. Gansevoort Street, Little Falls, N. Y.
- Ferguson, William Gladstone, III, '09 (D).**
Assistant Agent, Ludlow Manufacturing Asso-
ciates, Ludlow, Mass.
- Ferris, Arthur Leon, II, '28 (D).**
Port Rowan, Ont.
- Feuerstein, James Mayer, VI, '40 (B.T.E.).**
Corporal, U. S. Army.
- Fieldsend, Arthur Tull, II, '43 (D).**
Pfc., U. S. Army, Overseas.
- Finard, Saunder, IV, '41 (B.T.C.).**
Lieutenant, USNR, c/o Fleet Post Office, New
York, N. Y.
- Fine, Theodore, VI, '44 (B.T.E.).**
Research Engineer and Designer, Manhattan
Shirt Company, New York, N. Y.
- Fisher, Russell Todd, VI, '14 (D). '25 (B.T.E.).**
President & Secretary, National Association of
Cotton Manufacturers, 80 Federal Street, Bos-
ton, Mass.
- Fisher, Thomas Nathan, VI, '42 (B.T.E.).**
Ensign, USNR.
- Fiske, Starr Hollinger, II, '09 (D).**
119 Livingston Avenue, Lowell, Mass.
- Fitzgerald, John Francis, IV, '18 (B.T.C.).**
Fitzgerald's Cleansers, Winchester, Mass.
- Fitzgerald, John Francis, IV, '28 (B.T.C.).**
- Fleischmann, Meyer, IV, '20 (B.T.C.).**
Chief Chemist, Real Silk Hosiery Mills, Inc.,
Indianapolis, Ind.
- Fleming, Frank Everett, IV, '06 (D).**
Research & Development Engineer, Goodall
Worsted Company, Sanford, Maine.
- Fletcher, Roland Hartwell, VI, '10 (D).**
Pressed Steel Car Company, Inc., McKees
Rocks, Pa.
- Flood, Thomas Henry, IV, '27 (B.T.C.).**
Chemist and Salesman, National Aniline &
Chemical Co., Toronto, Ont.
- Flynn, Thomas Patrick, IV, '11 (D).**
Captain, U. S. Army, C.M.P.
- Foisy, Robert William, VI, '43 (B.T.E.).**
Lieutenant, U. S. Army Air Corps. Overseas
- Ford, Edgar Robinson, IV, '11 (D).**
Superintendent, Bleaching, Dyeing and Finish-
ing, Sayles Biltmore Bleacheries, Biltmore,
N. C.
- Ford, Stephen Kenneth, IV, '28 (B.T.C.).**
Major, U. S. Army, Chemical Warfare, Execu-
tive and Property Officer, San Antonio, Texas.
- Forsait, Charles Henry, VI, '20 (B.T.E.).**
Superintendent, Nashua Manufacturing Com-
pany (Jackson Mills), Nashua, N. H.
- Forsait, Ralph Allen, VI, '16 (B.T.E.).**
General Superintendent, Indianapolis Bleach-
ing Co., Indianapolis, Ind.
- Forsyth, Harold Downes, VI, '23 (B.T.E.).**
Treasurer, William Forsyth & Sons Company,
Lynn, Mass.
- Forsythe, George, VI, '34 (B.T.E.).**
- Foss, George Woodrow, II, '38 (D).**
General Manager and Partner, L. N. Barry
Company, Cambridge, Mass.

- Foster, Boutwell Hyde, VI, '17 (B.T.E.).
Manager, Textile Section, General Labs.,
United States Rubber Company, Passaic, N. J.
- Foster, Clarence Everett, VI, '43 (B.T.E.).
Supervisor in Research Work, Radiation Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.
- Foster, Clifford Eastman, II, '01 (D).
Fowle, Edwin Daniels, VI, '24 (B.T.E.).
Publisher and Editor, Textile World, 330 West 42nd Street, New York 18, N. Y.
- Fox, David James, VI, '34 (B.T.E.).
Assistant Superintendent, Horner Woolen Mills Company, Eaton Rapids, Mich.
- Fox, Kenneth Russell, VI, '38 (B.T.E.). (S.M. '40, Massachusetts Institute of Technology).
Assistant Professor, Textile Technology, Massachusetts Institute of Technology, Cambridge, Mass.
- Fox, Louise, VI, '40 (B.T.E.).
Textile Technician, Meyer Woolens, Inc., 1 West 47th Street, New York 19, N. Y.
- Fox, Theodore Webster, VI, '40 (B.T.E.).
First Lieutenant, Army Air Corps, Engineering Division, Wright Field, Dayton, Ohio.
- Franks, Jerome, VI, '27 (B.T.E.). (M.S. 1929 Massachusetts Institute of Technology.)
With Marillyn Silk Mills, Phillipsburg, N. Y.
- Frederickson, Charles Joseph, Jr., IV, '29 (B.T.C.).
Chemist, White & Hodges, Everett, Mass.
- Freedman, David, VI, '36 (B.T.E.).
Quartermaster Depot, Philadelphia, Pa.
- French, Wallace Howe, IV, '31 (B.T.C.).
Overseer of Bleaching & Dyeing, Atlas Underwear Company, Richmond, Ind.
- Frost, Harold Benjamin, II, '12 (D).
Resident Manager, Liberty Mutual Insurance Company, Brookton, Mass.
- Fuller, Allen Reed, IV, '17 (B.T.C.).
Textile Chemist, A. E. Staley Manufacturing Company, Decatur, Ill.
- Fuller, George, I, '03 (D).
Textile Consultant, Cox and Fuller, 320 Broadway, New York City.
- Fuller, Samuel Lloyd, VI, '43 (B.T.E.).
Lieutenant (j.g.), USNR.
- Fyfe, Robert Clark, VI, '40 (B.T.E.).
Lieutenant, U. S. Army Air Force, Navigation, Ground School, Walla Walla, Wash.
- G
- Gagnon, Roland Joseph Octave, IV, '36 (B.T.C.).
Textile Engineer, United States Testing Company, Inc., Hoboken, N. J.
- Gahn, George Leonhard, II, '06 (D).
Worsted Yarn Superintendent, Wood Worsted Mills, Lawrence, Mass.
- Gainey, Francis William, IV, '11 (D).
Technician, National Aniline Division, Allied Chemical & Dye Corporation, Boston, Mass.
- Gale, Harry Laburton, III, '10 (D).
Chief of Textile Section, Foreign Economic Administration, Washington, D. C.
- Gallagher, Arthur Francis, IV, '30 (B.T.C.).
Chemist, Hayward Schuster Woolen Mills, Inc., East Douglas, Mass.
- Gallagher, John Waters, II, '27 (D).
American Hair & Felt Co., Newark, N. J.
- Garcia, Julio, II, '44 (D).
Pedro de Valdivia 128, Santiago, Chile.
- Garcia, Lorenzo Montero, VI, '38 (B.T.E.).
Technical Director, Cia. Textil "El Faisan" S. A., Mexico D. F., Mexico.
- Gari, Jose Via, VI, '41 (B.T.E.).
Superintendent, Barron-Colmena S. A., Colmena, Edo. de Mexico, Mexico.
- Garlick, Mrs. Dorothy M. (Burbeck, Dorothy M.), IV, '20 (B.T.C.).
Chemist, American Woolen Company, Maynard, Mass.
- Garner, Allen Frank, II, '30 (D).
President, Kezar Falls Woolen Company, Kezar Falls, Maine.
- Garnett, Richard Herbert, VI, '43 (B.T.E.).
Lieutenant (j.g.) USNR. Overseas.
- Garnett, Stanley Arthur, II, '41 (D).
Captain, U. S. Army, Quartermaster Corps, Overseas.
- Garnett, Mrs. Stanley A. (Keirstead, Edith L.), III, '42 (D).
1046 Narragansett Boulevard, Providence, R. I.
- Gass, Matthew, IV, '41 (B.T.C.).
U. S. Navy.
- Gatzimos, Stephen Aristophanes, IV, '41 (B.T.C.).
- Gaudet, Walter Urban, II, '29 (D).
Supervisor, Walsh Kaiser Company, Providence, R. I.
- Gay, Clarence Russel, II, '39 (D).
U. S. Army. Missing in action in Germany.
- Gay, Leon Stearns, Jr., II, '37 (D).
Vice President, Gay Bros. Co., Cavendish, Vt., and Manager, Gaymont Mill, Ludlow, Vt.
- Gay, Olin Dow, II, '08 (D).
President, Gay Brothers Company, Cavendish, Vt.
- Georgacoulis, George, IV, '36 (B.T.C.).
Process Chemist, E. I. du Pont de Nemours, Arlington, N. J.
- Getchell, Nelson Fletcher, IV, '38 (B.T.C.).
Chemist and Research Engineer, Ludlow Manufacturing & Sales Co., Ludlow, Mass.
- Gianaris, George Demetrios, VI, '39 (B.T.E.).
Textile Inspector, Jeffersonville Quartermaster Depot, Jeffersonville, Ind.
- Gifford, Alden Ives, Jr., VI, '34 (B.T.E.).
Assistant to Treasurer, Beacon Mfg. Co., Swannanoa, N. C.
- Gill, John Schofield, IV, '40 (B.T.C.).
With Dize Awning and Tent Co., Winston-Salem, N. C.
- Gillespie, Francis Clifford, IV, '34 (B.T.C.).
Inspection Supervisor (Army Ordnance), War Dept., Philadelphia, Pa.
- Gillick, Thomas John, Jr., IV, '43 (B.T.C.).
Lieutenant, U. S. Army Air Corps, Army Airways Communication System.
- Gillie, Stanley James, I, '22 (D).
Manager, Southern Testing House, United States Testing Company, Inc., Greensboro, N. C.
- Gillon, Sara Agnes, IIb, '06 (C).
- Gilman, Ernest Dana, II, '26 (D).
Men's Wear Designer & Stylist, Pacific Mills, Worsted Division, 261 Fifth Avenue, New York 16, N. Y.
- Gleklen, Leo, IV, '32 (B.T.C.).
Dyestuff Demonstrator and Salesman, United Aniline Company, Boston, Mass.
- Glowacki, Joseph, VI, '32 (B.T.E.).
105 Salem Street, Andover, Mass.
- Glowinski, Mitchell, IV, '34 (B.T.C.).
With Lawrence Manufacturing Company, Lowell, Mass.
- Godfrey, Harold Thomas, VI, '26 (B.T.E.).
Sales Engineer-Director, Davis & Furber Machine Co., North Andover, Mass.
- Goldberg, George, VI, '10 (D).
Manager, Liberty Lace and Braid Company, Boston, Mass.
- Goldberg, Herbert Arthur, VI, '43 (B.T.E.).
Ensign, USNR.
- Goldenberg, Louis G., VI, '27 (B.T.E.).
- Goldman, Moses Hyman, IV, '20 (B.T.C.).
Chief Dye and Finishing Branch, Cotton and Synthetic Textiles Division, War Production Board, Washington, D. C.
- Golec, Edward Lucian, III, '32 (D).
Handkerchief Designer, Manhattan Shirt Company, New York City.
- Goller, Harold Poehlmann, II, '23 (D).
Sales, The Dayton Rubber Mfg. Co., Philadelphia, Pa.
- Goodhue, Amy Helen, IIb, '00 (C).
See Harrison, Mrs. Arthur.
- Gooding, Francis Earle, IV, '19 (B.T.C.).
Superintendent, Calco Chemical Company, Bound Brook, N. J.
- Goodwin, John Alden, VI, '40 (B.T.E.).
Sergeant, Army Air Force, 19th Weather Detachment, c/o Postmaster, New York, N. Y.
- Goosetrey, Arthur, IV, '21 (B.T.C.).
With French Worsted Company, Woonsocket, R. I.

- Goosetrey, John Thomas, IV, '21 (B.T.C.).**
Superintendent of Dyeing and Bleaching, New York Mills, New York Mills, N. Y.
- Gordon, Mrs. James J. (O'Leary, Louise M.), IV, '43 (B.T.C.).**
Chemist, Pacific Mills, Lawrence, Mass.
- Gottschalk, Lawrence William, VI, '28 (B.T.E.).**
Sales Engineer, Scott & Williams, Inc., 350 Fifth Avenue, New York City.
- Gould, Norman Culver, VI, '19 (B.T.E.).**
Textile Designer, F. C. Huyck & Sons, Albany, N. Y.
- Graham, Robert Theodore, IV, '34 (B.T.C.).**
Supervisor, Hanford Engineer Works, Richmond, Wash.
- Greenbaum, Herbert Baron, III, '29 (D).**
- Greenbaum, Hyman Herbert, IV, '35 (B.T.C.).**
Proprietor, Exeter Food Center, Exeter, N. H.
- Greenberg, Archie, II, '21 (D).**
- Greendonner, George John, Jr., IV, '30 (B.T.C.).**
Textile Chemist, Buffalo Electro-Chemical Co., Inc., Buffalo 7, N. Y.
- Greene, John Lester, VI, '39 (B.T.E.).**
First Lieutenant, U. S. Army Textile Research, Material Command, Wright Field, Dayton, Ohio.
- Greenwood, John Roger, II, '27 (D).**
Superintendent, W. W. Windle Company, Millbury, Mass.
- Gregory, Robert Crockett, VI, '34 (B.T.E.).**
Lieutenant (j.g.), USNR.
- Griffin, Roger Castle, Jr., IV, '43 (B.T.C.).**
Graduate Student, Lowell Textile Institute.
- Griffin, Vernon Harcourt, IV, '35 (B.T.C.).**
Overseer of Dyeing and Finishing, Samson Cordage Works, Shirley, Mass.
- Grondin, Abraham Hector, IV, '41 (B.T.C.).**
First Lieutenant, U. S. Army, Chemical Warfare Service, Overseas.
- Gross, Herman Peter, IV, '30 (B.T.C.).**
Lieutenant, U. S. Air Corps.
- Grossman, Clinton, IV, '38 (B.T.C.).**
Corporal, U. S. Army Q.M.C.
- Grossman, Edward, VI, '42 (B.T.E.).**
- Guild, Lawrence Winfield, VI, '27 (B.T.E.).**
President, L. W. Guild Company, Inc., 140 Harrison Avenue, Boston, Mass.
- Guilfoyle, Donald William, VI, '41 (B.T.E.).**
First Lieutenant, U. S. Army Air Force Pilot.
- Guimaraes, Paulo Mourao, I, '44 (D).**
Caixa 101, Rio de Janeiro, Brazil.
- Gwinnell, George Harry, II, '25 (D).**
Superintendent, Berkshire Woolen Company, Pittsfield, Mass.
- Gyzander, Arne Kolthoff, IV, '09 (D).**
Chemist, National Aniline Division, Allied Chemical & Dye Corp., 40 Rector Street, New York City.

H

- Haddad, Nassib, VI, '23 (B.T.E.).**
Textile Engineer, General Laboratory, United States Rubber Company, Passaic, N. J.
- Hadley, Richard Francis, IV, '22 (B.T.C.).**
Sales Engineer, Parks & Woolson Machine Company, Springfield, Vt.
- Hadley, Walter Eastman, IV, '08 (D).**
Concord, N. H.
- Hadley, Wilfred Nourse, II, '22 (D).**
Manager, Parks & Woolson Machine Company, Springfield, Vt.
- Hager, Hazen Otis, II, '21 (C).**
Owner and Manager, Hager Auto Parks, Portland, Maine.
- Haggerty, William Thomas, IV, '43 (B.T.C.).**
U. S. Army Air Force.
- Hakanson, Gustave Warren, IV, '37 (B.T.C.).**
Asst. Supt., Standards Control Dept., Acetate Yarn Division, Tennessee Eastman Corporation, Kingsport, Tenn.
- Hale, Alfred Sandel, IV, '09 (D).**
360 West Main Street, Rockaway, N. J.
- Hale, Ralph Edgar, IV, '31 (B.T.C.).**
Chemist, The Bell Company, Worcester, Mass.
- Hall, Frederick Kilby, VI, '24 (B.T.E.). (A.M. 1930, The George Washington University.)**
Major, Quartermaster Corps, Overseas.

- Hall, Richard Thomas, IV, '40 (B.T.C.).**
U. S. Army.
- Hall, Stanley Arundel, IV, '31 (B.T.C.).**
Gas Instrument and Control Technician, New England Power Service Company, Malden, Mass.
- Halsell, Elam Ryan, I, '04 (C).**
Physician, 1301 18th Avenue, Meridian, Miss.
- Hamer, David Orville, IV, '42 (B.T.C.).**
Lieutenant (j.g.), USNR, c/o Fleet Post Office, San Francisco, Calif.
- Hammond, Chester Twombly, II, '23 (D).**
Manager, Niagara Rug & Carpet Company, Inc., Buffalo, N. Y.
- Hanscom, Edwin Thomas, II, '27 (D).**
Asst. Supt. and Personal Manager, John T. Slack Corp., Springfield, Vt.
- Hardie, Newton Gary, I, '23 (D).**
General Superintendent, Gossett Mills, Anderson, S. C.
- Hardman, Joseph Edwin, IV, '32 (B.T.C.).**
Textile Products Company, Lowell, Mass.
- Hardy, Philip Lewis, VI, '10 (D).**
Contractor, Andover, Mass.
- Hardy, Thomas Wadsworth, IV, '38 (B.T.C.).**
Lieutenant (j.g.) USNR, c/o Fleet Post Office, San Francisco, Calif.
- Harmon, Charles Francis, I, '99 (D).**
- Harper, Cyril Newcomb, IV, '42 (B.T.C.).**
Second Lieutenant, U. S. Air Corps.
- Harpoat, Burgess Charles, VI, '38 (B.T.E.).**
S/Sgt., U. S. Army.
- Harrington, Thomas, IV, '15 (D).**
President, Hart & Harrington, 925 Weed Street, Chicago, Ill.
- Harris, Carl Webster, II, '42 (D).**
U. S. Army. Overseas.
- Harris, Charles Edward, I, '05 (D).**
With Metro Oil Burner Company, Easthampton, Mass.
- Harris, George Simmons, I, '02 (C).**
President and Treasurer, Riverside & Dan River Cotton Mills, Danville, Va.
- Harrison, Mrs. Arthur (Goodhue, Amy Helen), IIb, '00 (C).**
- Harrison, Maurice William, VI, '44 (B.T.E.).**
Pacific Mills, Lawrence, Mass.
- Hart, Arthur Norman, IV, '19 (B.T.C.).**
- Hart, Howard Roscoe, I, '23 (D).**
Vice-President, Brighton Mills, Inc., Shannon, Ga.
- Harwood, Ralph, IV, '35 (B.T.C.).**
Technologist, Research & Development, Quartermaster Depot, Philadelphia, Pa.
- Hassett, Paul Joseph, IV, '12 (D).**
Cortland Works Manager, L. C. Smith & Corona Typewriters, Inc., Cortland, N. Y.
- Hathaway, William Tabor, II, '26 (D).**
Cashier, Commonwealth of Massachusetts, State House, Boston, Mass.
- Hathorn, George Wilmer, IV, '07 (D).**
Chemist, Lawrence Gas & Electric Company, Lawrence, Mass.
- Hathorne, Berkeley Lewis, IV, '24 (B.T.C.).**
President, Berkeley Products Company, New York, N. Y.
- Hay, Ernest Crawford, II, '11 (D).**
Agent, Monomac Spinning Company, Lawrence, Mass.
- Haynes, Amos Kempton, IV, '29 (B.T.C.).**
Technician and District Manager, Rohm & Haas Co., Inc., Atlanta, Ga.
- Heffernan, John Vincent, IV, '35 (B.T.C.).**
U. S. Coast Guard.
- Hegy, Gerard John Joseph, VI, '32 (B.T.E.).**
Dyer, Hegy's, Inc., Holyoke, Mass.
- Hendrickson, Walter Alexander, II, '11 (D).**
Plant Manager, Max Lowenthal & Sons, Rochester, N. Y.
- Hennigan, Arthur Joseph, II, '06 (D).**
- Hetherman, Patrick Joseph, IV, '29 (B.T.C.).**
- Hibbard, Frederick William, IV, '25 (B.T.C.).**
Lieutenant, USNR.
- Higginbottom, George Stephen, IV, '41 (B.T.C.).**
Junior Chemist, Naval Clothing Depot, Brooklyn, N. Y.
- Hildreth, Harold William, II, '07 (D).**
Westford, Mass.

- Hillman, Ralph Greeley, VI, '22 (B.T.E.).**
Production Manager, Samson Cordage Works, Boston, Mass.
- Hindle, Milton, VI, '25 (B.T.E.).**
Instructor, Department of Textile Engineering, Lowell Textile Institute, Lowell, Mass.
- Hintze, Thomas Forsyth, I, '06 (C.).**
- Hobson, Edward Shackford, III, '40 (D.).**
Captain, U. S. Army, c/o Post Office, New York, N. Y.
- Hochschild, Reinhard George, IV, '43 (B.T.C.).**
Pfc., U. S. Army, c/o Postmaster, New York, N. Y.
- Hockmeyer, Clive Edward, Jr., I, '40 (D.).**
Industrial Engineer, E. I. du Pont de Nemours & Co., Inc., Pasco, Wash.
- Hockridge, Stanley Squire, IV, '32 (B.T.C.).**
Technician, Stein Hall, Inc., Charlotte, N. C.
- Hodge, Harold Bradley, VI, '22 (B.T.E.).**
Engineer, Board of Education, Manchester, Conn.
- Hodgman, Richard Albert, VI, '36 (B.T.E.).**
Assistant Superintendent, Berkshire Division "A," Berkshire Fine Spinning Associates, Inc., North Adams, Mass.
- Hoffman, Richard Robert, II, '21 (C.).**
- Holbrook, Ralph Wentworth, IV, '29 (B.T.C.).**
Chemical Engineer, Colgate-Palmolive-Peet Company, Jeffersonville, Ind.
- Holden, Arthur Newton, VI, '36 (B.T.E.).**
U. S. Army.
- Holden, Francis Crawford, IV, '09 (D.).**
Chemist, Ludlow Manufacturing & Sales Company, Ludlow, Mass.
- Holden, John Sanford, II, '20 (D.).**
Manufacturer, Automatic Machine Products Company, Attleboro, Mass.
- Holgate, Benjamin, III, '02 (C.).**
Agent, Boott Mills, Lowell, Mass.
- Holgate, Benjamin Alexander, VI, '36 (B.T.E.).**
Associated Textile Engineer, U. S. Army Air Corps, War Department, Wright Field, Dayton, Ohio.
- Hollings, James Louis, I, '05 (D.).**
Industrial Engineer, Ekholm Associates, 31 Milk Street, Boston, Mass.
- Hollstein, William Diedrick, VI, '25 (B.T.E.).**
Physician, Westfield, N. J.
- Holmes, Otis Milton, VI, '13 (B.T.E.).**
Draftsman, United Shoe Machinery Corporation, Beverly, Mass.
- Holt, Laurence Currier, VI, '29 (B.T.E.).**
Textile Technician, Celanese Corporation of America, Narrows, Va.
- Hood, Leslie Newton, IV, '12 (D.).**
- Hook, Russell Weeks, IV, '05 (D.).**
Textile Chemist, Arthur D. Little, Inc., Cambridge, Mass.
- Hooper, Clarence, IV, '27 (B.T.C.).**
T/Sgt., U. S. Army, Overseas.
- Horne, James Albert, I, '24 (D.).**
Department Manager, Wellington, Sears Co., Inc., 65 Worth Street, New York 13, N. Y.
- Horsfall, George Gordon, II, '04 (C.).**
Assistant Dyer, Interwoven Mills, Inc., Martinsburg, W. Va.
- Horton, Chester Temple, VI, '14 (B.T.E.).**
Wilmington, Mass.
- Hosmer, Frank Barbour, IV, '31 (B.T.C.).**
Salesman, U. S. Dyestuff Corporation, Boston, Mass.
- Houghton, Robert Kingsbury, IV, '23 (B.T.C.).**
Chief Chemist, Bigelow-Sanford Carpet Company, Inc., Thompsonville, Conn.
- Howard, Philip John, IV, '43 (B.T.C.).**
Chemical Engineer, General Electric Company, Lynn, Mass.
- Howard, Winfield Hersey, IV, '38 (B.T.C.).**
Lieutenant (i.g.), USNR, c/o Fleet Post Office New York, N. Y.
- Howarth, Charles Lincoln, IV, '17 (B.T.C.).**
Assistant Professor of Dyeing, Lowell Textile Institute, Lowell, Mass.
- Howe, Woodbury Kendall, I, '10 (D.).**
With Lorraine Manufacturing Co., Pawtucket, R. I.
- Howorth, Harmon, VI, '30 (B.T.E.).**
Celanese Corporation of America, Narrows, Va.
- Hoyt, Charles William Henry, IV, '07 (D.).**
Civil Engineer, Chemical Construction Corp., 30 Rockefeller Plaza, New York, N. Y.
- Hsu, Hsueh-Chang, VI, '23 (B.T.E.).**
With Tsu Ya Iron Works, Shanghai, China.
- Hubbard, Harold Harper, I, '22 (D.).**
Asst. Sales Manager, Columbus Manufacturing Company, 40 Worth Street, New York City.
- Hubbard, Ralph King, IV, '11 (D.).**
President and Treasurer, Packard Mills, Inc., Webster, Mass.
- Huising, Geronimo Huerva, I, '08 (D.).**
- Hull, Robert Barney, VI, '40 (B.T.E.).**
Textile Engineer, United States Testing Company, Inc., Hoboken, N. J.
- Hunt, Chester Lansing, III, '05 (C.).**
- Hunter, Robert Arnold, VI, '42 (B.T.E.).**
Lieutenant, U. S. Naval Reserve.
- Hunton, John Horace, II, '11 (D.).**
Personal Director, L. S. Starrett Co., Athol, Mass.
- Hurd, Ira Swain, IV, '29 (B.T.C.).**
Superintendent of Technical Development, Riverside & Dan River Mills, Danville, Ga.
- Hurtado, Leopoldo, VI, '10 (D.).**
- Hurwitz, Jacob, IV, '23 (B.T.C.).**
- Hutton, Clarence, III, '03 (C.).**
Advertising, Davis & Furber Machine Company, North Andover, Mass.
- Huyck, William Francis, II, '34 (D.).**
Ski Troops, U. S. Army.
- Hyman, Wolfred, II, '28 (D.).**
Men's Clothier, Hyman Brothers, Boston, Mass.

I

- Inkpen, Norman Alfred, IV, '41 (B.T.C.).**
U. S. Army, Q.M.C., Climatic Research Laboratory, Lawrence, Mass.
- Ireland, Wilson Gerard, VI, '36 (B.T.E.).**
Duplan Corporation, Hazleton, Pa.
- Irvine, James Andrew, VI, '17 (B.T.E.).**
Major, Corps of Engineers, U. S. Army, Post Headquarters, Fort Belvoir, Va.
- Isaacson, George Franklin, II, '26 (D.).**
Head of Shirt Department, Lessem Bach Co., Inc., New York City.
- Ivers, Gerald Anthony, IV, '31 (B.T.C.).**
Lieutenant, U. S. Naval Reserve.

J

- Jaeger, Robert William, IV, '23 (B.T.C.).**
Lubrication Engineer, Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Ill.
- James, Ernest Peter, IV, '42 (B.T.C.).**
Lieutenant (j.g.), U. S. Navy.
- Jarek, Helen Jane, IV, '39 (B.T.C.).**
Teacher, High School, Lowell, Mass.
- Jarek, Julius, IV, '31 (B.T.C.).**
Lieutenant (j.g.), USNR, Overseas.
- Jay, Joshua Daniel, VI, '42 (B.T.E.).**
Assistant Superintendent, Star Woolen Company, Cohoes, N. Y.
- Jay, Milton J., VI, '44 (B.T.C.).**
S2/c, U. S. Navy, U. S. Naval Hospital, San Diego 34, Calif.
- Jelleme, William Oscar, I, '10 (D.).**
With Pacific Mills, 1 West Central Avenue, East Newark, N. J.
- Jen Shang, Wu, I, '21 (D.).**
Northwestern College of Technology, Chenkuo-Shensi, China.
- Jessen, Robert Frederick, I, '36 (D.).**
Research Engineer, Callaway Institute, La Grange, Ga.
- Jessop, Charles Clifford, VI, '22 (B.T.E.).**
Industrial Engineer, Stevenson, Jordan, Harrison, New York, N. Y.
- Johnson, Arthur Kimball, IV, '13 (D.). (S.B. 1917, Massachusetts Institute of Technology.)**
Control Analytical Chemist, Aridye Corporation, Fair Lawn, N. J.
- Johnson, George Henry, IV, '20 (B.T.C.).**
General Manager, American Institute of Laundering, Joliet, Ill.
- Johnson, John Thomas, IV, '43 (B.T.C.).**
Lieutenant (j.g.), USNR.

- Johnson, Norman Albin, IV, '31 (B.T.C.).**
Managing Editor, American Dyestuff Reporter,
Howes Publishing Company, Inc., 440 Fourth
Avenue, New York City.
- Johnson, Phillip Stanley, IV, '24 (B.T.C.).**
Johnston, Lee Gale, IV, '37 (B.T.C.).
Textile Chemist, Research Department, Amer-
ican Institute of Laundering, Joliet, Ill.
- Jones, Bliss Morris, IV, '30 (B.T.C.).**
Sales Manager, Rodney Hunt Machine Com-
pany, Orange, Mass.
- Jones, Charles Andrews, Jr., VI, '41 (M.S.).**
(B.S. 1919, Virginia Military Institute—
M.S. 1927, University of Wisconsin.)
Major, U. S. Army, Overseas.
- Jones, Everett Amos, III, '05 (D).**
3 Park Place, Auburn, N. Y.
- Jones, Nathaniel Erskine, I, '21 (D).**
Assistant Professor, Cotton Yarn Department,
Lowell Textile Institute, Lowell, Mass.
- Joslin, Harold Wheeler, II, '28 (D).**
Merchant, Cut Rate Store, Windsor, Vt.
- Joy, Thomas, VI, '26 (B.T.E.).**
Sales Engineer, Gulf Oil Corporation, Boston,
Mass.
- Jury, Alfred Elmer, IV, '04 (D).**
Agent, Winnsboro Mills, Winnsboro, S. C.

K

- Katze, Julius, VI, '22 (B.T.E.).**
- Kaiser, J. Raymond, VI, '36 (B.T.E.).**
Lieutenant (j.g.), USNR, Bureau of Aero-
nautics, Washington, D. C.
- Kane, Roger Hugh, II, '38 (D).**
Lieutenant, U. S. Army. Died from wounds re-
ceived in action, 1944.
- Kao, Chieh-Ching, VI, '23 (B.T.E.).**
China Cotton Trade Corp., Chungking, China.
- Kaplan, Samuel Gilbert, IV, '38 (B.T.C.).**
Textile Inspector, U. S. A. Quartermaster
Depot, Boston, Mass.
- Karanfilian, John Hagop, VI, '21 (B.T.E.).**
- Kay, Harry Pearson, II, '09 (D).**
Associate Member, Penn Mutual Life Insur-
ance Company, Boston, Mass.
- Keirstead, Edith Louise, III, '42 (D).** (See Mrs.
Stanley A. Garnett.)
- Kelakos, Charles George, VI, '38 (B.T.E.).**
Captain, Air Corps, Communications Office,
U. S. Army.
- Kelly, Allan William, VI, '43 (B.T.E.).**
Aeronautical Engineer, Navy Department,
Bureau of Aeronautics, Washington, D. C.
- Kelly, Warren Thomas, VI, '38 (B.T.E.).**
Laboratory Technician, Philadelphia Quartermaster
Depot, Philadelphia, Pa.
- Kendall, Charles Henry, II, '23 (D).**
Superintendent, Bridgewater Woolen Com-
pany, Bridgewater, Vt.
- Kennedy, Francis Charles, VI, '26 (B.T.E.).**
Engineer, United States Rubber Company,
Detroit, Mich.
- Kennedy, James Harrington, Jr., VI, '36**
(B.T.E.), '40 (M.S.).
Captain, Quartermaster Depot, Production
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1937, Harvard University.)
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New England Representative, The Spool Cotton Co., New York, N. Y.
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Ensign, U. S. Navy.
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Concord Road, Billerica, Mass.
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Assistant Superintendent, Macon Textiles, Inc., Macon, Ga.
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- Oppenheim, Morton Lewis, VI, '42 (B.T.E.).
Aviation Cadet, U. S. Army.
- Orlauskii, Anthony, IV, '32 (B.T.C.).
Dyer, Bradford Dyeing Association, Bradford,
R. I.
- Orr, Andrew Stewart, IV, '22 (B.T.C.).
Manager, Storey & Co., Brockton, Mass.
- Osborne, George Gordon, VI, '28 (B.T.E.).
(M.Sc. 1932, North Carolina State College.)
President, Greenville Mills, Inc., Boston, Mass.
- Othote, Louis Joseph, I, '23 (D).
Sales and merchandising, J. W. Valentine Co.,
Inc., 40 Worth Street, New York City.

P

- Paige, Walter Hale Jr., VI, '38 (B.T.E.).
U. S. Service. Killed in action.
- Palais, Samuel, IV, '18 (B.T.C.).
With Worcester Knitting Company, Worcester,
Mass.
- Pappas, Vasil James, IV, '42 (B.T.C.).
Lieutenant, U. S. Army Air Corps Pilot.
- Parechian, James Humphrey, IV, '35
(B.T.C.). '38 (M.S.).
Lieutenant, U. S. Chemical Warfare Service.
- Parigian, Harold Hrant, IV, '28 (B.T.C.).
- Parker, Everett Nichols, I, '05 (D).
President, Parker Spool and Bobbin Company,
27-53 Middle Street, Lewiston, Maine.
- Parker, Mrs. Herbert L. (Meek, Lotta L.),
IIIB, '07 (C).
- Parker, Hubert Frederic, VI, '20 (B.T.E.).
Mill Engineer, Castanea Paper Company,
Lock Haven, Pa.
- Parker, John George, Jr., IV, '31 (B.T.C.).
Plant Manager, Textile Service and Chemical
Corporation, North Quincy, Mass.
- Parkin, Robert Wilson, VI, '27 (B.T.E.).
Production Manager, Limerick Yarn Mills,
Limerick, Maine.
- Parkis, William Lawton, I, '09 (D).
President and General Manager, Connecticut
Cordage Company, North Oxford, Mass.
- Parsons, Charles Sumner, VI, '27 (B.T.E.).
Superintendent, Hathaway Manufacturing
Company, New Bedford, Mass.
- Patrick Stephen Edmund, Jr., I, '41 (D).
With Saco-Lowell Shops, Biddeford, Maine.
- Patsourakos, James Peter, IV, '39 (B.T.C.).
Lieutenant, U. S. Army Air Corps.

Peabody, Roger Merrill, II, '16 (D).
Application and Development Engineer, Scovill Manufacturing Company, Waterbury, Conn.

Pearlstein, Maxwell, III, '28 (D).

Pearsall, Samuel, II, '42 (D).
First Lieutenant, U. S. Army Air Corps—
Bombardier "Missing" over Rumania.

Pearson, Alfred Henry, IV, '11 (D).
Technical Advisor and Salesman, Ciba Company, Inc., 157 Federal Street, Boston, Mass.

Pearry, John Ervin, III, '31 (D).

Pease, Chester Chapin, I, '09 (D).
With Jackson Mills, Nashua, N. H.

Pease, Kilburn Gray, I, '38 (D).
U. S. Army. Killed in action.

Peck, Carroll Wilmot, IV, '13 (D).
President and Treasurer, George Mann & Co., Inc., Providence, R. I.

Pelt, Joseph Paul, Jr., VI, '40 (B.T.E.).
Assistant Manager and Partner, Groblue Sportswear, Newark, N. J.

Penney, Cabot William, III, '33 (D).
Superintendent, Wyandotte Worsted Company, Pittsfield, Mass.

Perkins, John Edward, III, '00 (D).
24 Abbott Street, Pittsfield, Mass.

Perkins, J. Dean, III, '08 (D).
Superintendent, Arms Textile Manufacturing Company, Manchester, N. H.

Perlman, Samuel, IV, '17 (B.T.C.). (LL.B. 1927, New Jersey Law School.)

Perlmutter, Barney Harold, IV, '23 (B.T.C.).
Treasurer, Mallon Mattress Corp., Boston, Mass.

Pernick, David, VI, '41 (B.T.E.).
Production Engineer, Joseph Pernick Co., Maspeth, L. I., N. Y.

Pero, Henry Leland, VI, '41 (B.T.E.).
Instructor, Wool Department, Lowell Textile Institute, Lowell, Mass.

Pero, Richard Omer, II, '31 (D).
Assistant Superintendent, Amos Abbot Company, Dexter, Maine.

Pesetzky, Herbert, III, '42 (D).
U. S. Army Air Corps. Overseas.

Peterson, Eric Arthur, IV, '31 (B.T.C.).
Marine Engineer, Office of Supervisor of Shipbuilding, U. S. Navy.

Petty, George Edward, I, '03 (C).
Real Estate, 211 Ashe Street, Greensboro, N. C.

Phaneuf, Maurice Philippe, III, '20 (D).
Accountant, Librairie St. Michel, Inc., Boston, Mass.

Phelan, Bernard Michael, IV, '29 (B.T.C.).
Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., 351 Abbott Road, Buffalo, N. Y.

Phelan, Leonard John, IV, '35 (B.T.C.).
U. S. Army, Chemical Warfare Service.

Phillips, Maurice Gordon, VI, '41 (B.T.E.).
U. S. Army.

Pierce, George Whitwell, IV, '25 (B.T.C.).
Superintendent of Dyeing and Finishing, Kramer Hosiery Company, Nazareth, Pa.

Pilligan, Hiag Nishan, IV, '32 (B.T.C.).
Staff Sergeant, U. S. Marine Corps, Depot of Supplies, Philadelphia, Pa.

Pillsbury, Ray Charles, I, '13 (D).
Advertising Manager, Universal Winding Company, Providence, R. I.

Pinatel, John Andre, VI, '43 (B.T.E.).
Ensign, USNR.

Pizzuto, Joseph James, Jr., IV, '33 (B.T.C.).
Teacher, Central High School of Needle Trades, New York, N. Y.

Plaisted, Webster E., II, '18 (D).
General Manager, Pacific Mills, Worsted Division, Lawrence, Mass.

Platt, Walter Wallace, IV, '41 (B.T.C.). '42 (M.S.).
Chief Control Chemist of Fuel Cells, U. S. Rubber Co., Naugatuck, Conn.

Ploubides, John Peter, IV, '38 (B.T.C.).
Colorist, Pacific Mills, Worsted Division, Lawrence, Mass.

Plovnick, Max David, IV, '35 (B.T.C.).
Textile Chemist, Thermoid Company, Southern Division, Charlotte, N. C.

Poremba, Leo Louis, IV, '35 (B.T.C.).
U. S. Army.

Portilla, Jose Luis, VI, '41 (B.T.E.).
Manager, Hilos Continental, S. A., Col. Agricola Oriental, Mexico.

Potter, Carl Howard, I, '09 (D).
Mill Sales Agent, 366 Broadway, New York City.

Pottinger, James Gilbert, II, '12 (D).
President, Treasurer and General Manager, Everlastik, Inc., 181 Spencer Avenue, Chelsea, Mass.

Powers, Walter Wellington, IV, '20 (B.T.C.).

Pradel, Alois Joseph, III, '00 (D).
78 Broad Street, Danielson, Conn.

Pradel, Mrs. Alois J. (Walker, Anna G.), IIIB, '03 (C).
78 Broad Street, Danielson, Conn.

Pratt, Caroline Elizabeth, IV, '42 (B.T.C.).
Chemist, Arlington Mills, Lawrence, Mass.

Precourt, Joseph Octave, VI, '21 (B.T.E.).
Vice-President, January & Wood Co., Maysville, Ky.

Prescott, Walker Flanders, IV, '09 (D).
Director, Prescott & Co., Reg'd, Montreal, Can.

Prescott, William Benjamin, IV, '39 (B.T.C.).
Second Lieutenant, U. S. Medical Corps. Overseas.

Preston, Harold Lawrence, VI, '30 (B.T.E.).
U. S. Navy.

Prien, Walter Ferdinand, U.S.N., VI, '39 (M.S.) (B.S., U. S. Naval Academy, 1930).
Commander, U. S. Navy, Naval Clothing Depot, Brooklyn, N. Y.

Puliafico, Carmelo Rosario, IV, '44 (B.T.C.).
Assistant Chemist, Carnston Printing Company, Webster, Mass.

Puliafico, Salvatore Joseph, IV, '41 (B.T.C.).
U. S. Army Signal Corps, c/o Postmaster, New York, N. Y.

Putnam, George Ives, IV, '16 (B.T.D.).
Manager, Textile Sales, American Resinous and Chemical Corporation Peabody, Mass.

Putnam, Leverett Nelson, IV, '10 (D).
Overseer of Dyeing, Pacific Mills, Worsted Division, Lawrence, Mass.

Putnam, Philip Clayton, IV, '13 (D).
Foreman Dyer, Apponaug Company, Apponaug, R. I.

Q

Qualey, Francis Joseph, IV, '38 (B.T.C.).
U. S. Army. Overseas.

Quigley, Gerald Francis, IV, '31 (B.T.C.).
Boss Dyer, Hampton Co., Easthampton, Mass.

Quinlan, William Harold, VI, '29 (B.T.E.).

R

Rabinowitz, Irving Manny, VI, '44 (B.T.E.).
U. S. Army.

Radford, Garland, II, '20 (D).
President, Oriental Textile Mills, Houston, Texas.

Ramsdell, Theodore Ellis, I, '02 (D).
President, Monument Mills, Housatonic, Mass.

Rand, Woodbury Holmes, II, '42 (D).
Lieutenant, U. S. Army Air Force, Aviation Communications, c/o Postmaster, New York, N. Y.

Rashkin, Bernard, VI, '41 (B.T.E.).
Time Study and Methods, Maidenform Brassiere Co., Bayonne, N. J.

Rawlinson, Dustin, IV, '42 (B.T.C.).
Ensign, U. S. Naval Reserve.

Rawlinson, Richard William, VI '31 (B.T.E.).
Supervisor, Shell Production, Whitin Machine Works, Whitesville, Mass.

Ray, Lloyd Sanford, IV, '30 (B.T.C.).
Superintendent, Rust Proofing and Metal Finishing Corp., Cambridge, Mass.

Raymond, Charles Abel, IV, '07 (D).
Silviculturist, Essex, Mass.

Recher, Theodore, VI, '33 (B.T.E.).
The Reelin Corporation, Mfg. and District Laundry and Tire Recapping Supplies, Milford Mass.

Redding, Leslie Capron, II, '26 (D).
Designer, Waucantuck Mills, Uxbridge, Mass.

- Reddish, Charles Warren, IV, '38 (B.T.C.).
Treasurer, City Dye Works, Springfield, Mass.
- Reddish, Warren Thomas, Jr., IV, '39 (B.T.C.).
Operating Cleaning-Dyeing Plant, City Dye Works, Inc., 1159 State Street, Springfield, Mass.
- Redmond, James Reynolds, IV, '36 (B.T.C.).
Textile Technologist, U. S. War Department, Quartermaster Corps, Jeffersonville, Ind.
- Reed, Everett Carlton, VI, '39 (B.T.E.).
Assistant Superintendent, Albany Felt Company, Albany, N. Y.
- Reed, Harold Ernest, VI, '37 (B.T.E.).
Assistant Editor, *Textile World*, New York, N. Y.
- Reed, Norman Bagnell, I, '10 (D).
President and Treasurer, Surgical Products, Inc., Lowell, Mass.
- Reed, William Thornecroft, VI, '39 (B.T.E.).
Lieutenant (j.g.), USNR.
- Rees, Richard Holmes, I, '40 (D).
Area Supervisor of Inspection, Quartermaster Depot, Philadelphia, Pa.
- Regan, Paul William, IV, '37 (B.T.C.).
Lieutenant (j.g.), USNR. Overseas.
- Reinhold, Kurt Herman, VI, '28 (B.T.E.).
Director of Priorities and Allocations, and Production Control Manager, The Russell Mfg. Co., Middletown, Conn.
- Reynolds, Fred Bartlett, II, '08 (D).
Purchasing Agent, M. T. Stevens & Sons Company, North Andover, Mass.
- Reynolds, Isabel Halliday, III, '03 (C).
Clerk, Pacific Mills Print Works, Lawrence, Mass.
- Reynolds, Raymond, II, '24 (D).
Supervisor, E. I. du Pont de Nemours & Co., Charlestown, Ind.
- Rice, Kenneth Earl, VI, '29 (B.T.E.).
With Sidney Blumenthal & Co., Shelton, Conn.
- Rich, Edward, IV, '15 (B.T.D.).
- Rich, Everett Blaine, III, '11 (D).
Wolfeboro, N. H.
- Rich, Milton Scott, II, '22 (D).
- Richardson, George Francis, IV, '44 (B.T.C.).
U. S. Army.
- Richardson, George Oliver, IV, '16 (B.T.D.).
Manager, Special Products Division, National Aniline Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York City.
- Richardson, Richardson Perry, I, '13 (D).
General Electric Company, Lowell, Mass.
- Riggs, Homer Chase, VI, '17 (B.T.E.).
President, Riggs & Lombard, Inc., Lowell, Mass.
- Ripley, George Keyes, II, '17 (D).
President, Troy Blanket Mills, Troy, N. H.
- Ritchie, Newell Baird, IV, '40 (B.T.C.).
Technical Sergeant, U. S. Army. Overseas.
- Rivers, William Anthony, II, '24 (D).
Manager, Metropolitan Life Insurance Company, Marlboro, Mass.
- Roarke, John James, IV, '36 (B.T.C.).
U. S. Quartermaster Corps, Jeffersonville, Ind.
- Robbins, Lucy Wiley, VI, '37 (B.T.E.).
See Weinbeck, Mrs. John C.
- Robbins, Walter Archibald, VI, '30 (B.T.E.).
Assistant to Plant Engineer, Columbia Mills, Inc., Minetto, N. Y.
- Roberson, Pat Howell, I, '05 (C).
Union State Bank, Pell City, Ala.
- Roberts, Angus Henry, IV, '41 (B.T.C.).
Captain, Chemical Warfare Service, U. S. Army.
- Roberts, Carrie Isabel, IIIB, '05 (C).
158 Dartmouth Street, Lowell, Mass.
- Roberts, Donald Chester, VI, '44 (B.T.E.).
With Pepperell Manufacturing Company, Biddeford, Maine.
- Roberts, Russell Frederick, VI, '42 (B.T.E.).
Ensign, USNR.
- Robillard, Gerald Adelbert, IV, '33 (B.T.C.).
Dyestuffs Salesman and Demonstrator, Canadian Industries, Ltd., Montreal, Que.
- Robinson, Ernest Warren, IV, '08 (D).
Manager, Line Division, The Shakespeare Company, Kalamazoo, Mich.
- Robinson, John Balda, II, '42 (D).
S2/c (RM), HT School (Radio), College Station, Texas.
- Robinson, Russell, VI, '21 (B.T.E.).
With United Cotton Products Company, Fall River, Mass.
- Robinson, William Albert, II, '25 (D).
Shipbuilding, Ipswich, Mass.
- Robinson, William Carleton, III, '03 (C).
- Robson, Frederick William Charles, IV, '10 (D).
- Rodalvitz, Francis Rudolph, IV, '28 (B.T.C.).
Chief Textile Research Chemist, Masury-Young Co., Boston, Mass.
- Rogoff, David, VI, '42 (B.T.E.).
Second Lieutenant, U. S. Army Air Corps.
- Roth, Paul, VI, '40 (B.T.E.). (Ed.M., 1941).
Assistant Superintendent, National Felt Company, Easthampton, Mass.
- Roumas, Zenon Anthony, IV, '42 (B.T.C.).
U. S. Army.
- Rowen, Edward Joseph, Jr., VI, '43 (B.T.E.).
Ensign, USNR, c/o Fleet Post Office, San Francisco, Calif.
- Rowntree, Clyde Burton, IV, '39 (B.T.C.).
Textile Bacteriologist and Chemist, Pacific Mills, Worsted Division, Lawrence, Mass.
- Royal, Louis Merry, VI, '21 (B.T.E.). (Ed.M., 1941, R. I. College of Education).
Teacher of Mathematics, East Senior High School, Pawtucket, R. I., and Lab. Inspector, Anaconda Wire Cable Co., Pawtucket, R. I.
- Runnells, Harold Nelson, IV, '25 (B.T.C.).
Draftsman, Samuel Eastman Co., Inc., Concord, N. H.
- Russell, Harold William, VI, '32 (B.T.E.).
In Charge of Textile Research Laboratory, Goodall Worsted Company, Sanford, Maine.
- Russell, John William, IV, '20 (B.T.C.).
Assistant Treasurer, American Lanolin Corporation, Lawrence, Mass.
- Russell, William Samuel, Jr., VI, '28 (B.T.E.).
Textile Division Manager, Keasbey & Mattison Co., Ambler, Pa.
- Ryan, David Louis, II, '27 (D).
Sales Agent, Duplan Corporation, 18 West Cheltenham Avenue, Philadelphia, Pa.
- Ryan, Lawrence Francis, IV, '23 (B.T.C.).
Demonstrator, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- Ryan, Millard Kenneth Thomas, Jr., II, '24 (D).
With E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.
- Ryberg, Bertil August, IV, '29 (B.T.C.), '36 (M.S.).
Associate Director of Research, American Association of Textile Chemists and Colorists, Lowell Textile Institute, Lowell, Mass.

S

- Sadler, Thomas Sheridan, II, '30 (D).
With Carolina Asbestos Company, Davidson, N. C.
- Saltsman, Sidney Irving, IV, '41 (B.T.C.).
Lieutenant, U. S. Navy, Motor Torpedo Boat Squadron.
- Sampson, Clifford William, IV, '28 (B.T.C.).
Sales Manager, Chemical Division, Emery Industries, Inc., Cincinnati, Ohio.
- Sanborn, Frank Morrison, VI, '19 (B.T.E.).
- Sanborn, Ralph Lyford, VI, '16 (B.T.E.).
Purchasing Agent, Firestone Cotton Mills, Inc., Gastonia, N. C.
- Sandlund, Carl Seth, VI, '25 (B.T.E.).
In Charge of Testing, Dyeing & Throwing, Proper-McCallum Hosiery Company, Northampton, Mass.
- Sanford, George Morse, Jr., VI, '43 (B.T.E.).
First Lieutenant, U. S. Army Air Corps, Philippines.
- Sargent, Robert Edward, IV, '25 (B.T.C.).
Chemist, Tubize Rayon Corporation, Rome, Ga.
- Sargent, Walter Ambrose, I, '22 (D).
Instructor, Textile Shop Practice, Board of Education, Passaic, N. J.
- Saunders, Harold Fairbairn, IV, '09 (D).
- Savard, Aime Albert, Jr., IV, '33 (B.T.C.).
Printing Department, United States Finishing Company, Norwich, Conn.

- Savery, James Bryan, II, '23 (D).**
Secretary, Stiles Lubricants, Inc., Hartford, Conn.
- Sawyer, Henry Severance, VI, '32 (B.T.E.).**
Treasurer, Sawyer, Regan Company, Dalton, Mass.
- Sawyer, Richard Morey, VI, '27 (B.T.E.). (M.S., 1929, Massachusetts Institute of Technology.)**
General Manager, Firestone Cotton Mills, Inc., Ft. Worth, Texas.
- Scanlon, Andrew Augustine, IV, '26 (B.T.C.).**
- Schaetzel, Andre Paul, IV, '21 (B.T.C.).**
Chief Chemist, Aspinook Corporation, Jewett City, Conn.
- Schiffer, Clifford Elais, IV, '43 (B.T.C.).**
Chemist, Process Engineering Department, Douglas Aircraft, Santa Monica, Calif.
- Schiffer, Lathrope Adolph, VI, '41 (B.T.E.).**
Stylist and Designer, Wollman Mills, Inc., New York, N. Y.
- Schlesinger, Morton, IV, '43 (B.T.C.).**
Lieutenant (j.g.), USNR.
- Schneiderman, Jacob, III, '27 (D).**
Golf Professional, Mt. Pleasant Country Club, Leicester, Mass.
- Schoelzel, Herman Walter, IV, '35 (B.T.C.).**
Overseer of Dyeing, Mascama Mills, Lebanon, N. H.
- Schreiter, Ehrich Ernest Max, VI, '26 (B.T.E.).**
Sun Oil Company, Revere, Mass.
- Schwarz, Herman Louis, IV, '22 (B.T.C.).**
Textile Chemist, Sandoz Chemical Works, Inc., 61 Van Dam Street, New York City.
- Scott, Gordon Maxwell, IV, '20 (B.T.C.).**
Superintendent of Finishing, Princeton Worsted Mills, Inc., Trenton, N. J.
- Shaber, Hyman Jesse, VI, '17 (B.T.E.). M.B.A., 1922 Harvard Graduate School of Business Administration.**
- Shafter, Stuart Frederic, IV, '42 (B.T.C.).**
Ensign, USNR.
- Shah, Kantilal Hiralal, VI, '36 (B.T.E.).**
India.
- Shah, Shantilal Hiralal, IV, '34 (B.T.C.).**
(M.B.A., 1936, Harvard Graduate School of Business Administration.)
India.
- Shain, Joseph, IV, '35 (B.T.C.).**
Dyer, Cowan & Shain, Haverhill, Mass.
- Shanahan, James Edward, II, '22 (D).**
Textile Inspector, Quartermaster Depot, U. S. War Department, Philadelphia, Pa.
- Shananquet, Mrs. Lee (Woodies, Ida A.), IIIB, '00 (C).**
- Shann, William Edwin, II, '35 (D).**
Research Engineer, Pacific Mills, Lawrence, Mass.
- Shapiro, Jeffrey Jay, VI, '42 (B.T.E.).**
- Shapiro, Sidney, VI, '38 (B.T.E.).**
Inspector, U. S. Army Quartermaster Corp, Boston, Mass.
- Shapiro, Simon, VI, '34 (B.T.E.).**
Partner, Lifeco Webbing Company, Fall River, Mass.
- Shea, Francis James, II, '12 (D).**
- Shea, John Francis, IV, '28 (B.T.C.).**
N. E. Manager, Becco Sales Corporation, 207 A Street, Boston, Mass.
- Shedd, Jackson Ambrose, III, '28 (D).**
Stylist and Designer, Forstmann Woolen Co., Passaic, N. J.
- Sheehan, Leo James, IV, '38 (B.T.C.).**
Chief, Textile Laboratory, Quartermaster Depot, U. S. War Department, Jeffersonville, Ind.
- Shelton, Charles Leopold, VI, '29 (B.T.E.).**
Major, U. S. Army, Quartermaster Corps, Research and Development, Washington, D. C.
- Shenker, Nahman, III, '25 (D).**
Senior Textile Inspector, Federal Government, Brooklyn, N. Y.
- Sidebottom, Leon William, IV, '11 (D).**
Chief Chemist, B. B. Chemical Company, Cambridge, Mass.
- Sidebottom, William James, IV, '44 (B.T.C.).**
Lieutenant, U. S. Army Air Corps, Combat Observer.
- Siegel, Harold, VI, '43 (B.T.E.).**
Ensign, USNR.
- Sigel, Mrs. A. E. (Calder, Marian B.), VI, '37 (M.S.). (B.S. 1934, College of Industrial Arts, Texas State College for Women).**
Senior Research Associate, Fabric Research Laboratories, Inc., 665 Boylston Street, Boston, Mass.
- Silberstein, Raymond, III, '39 (D), VI, '43 (B.T.E.).**
Government Inspector, Quartermaster Depot, Jersey City, N. J.
- Sill, Robert Herbert, VI, '43 (B.T.E.).**
U. S. Army. Overseas.
- Silverman, Joseph Melvin, VI, '40 (B.T.E.).**
First Lieutenant, U. S. Army. Overseas.
- Sinski, Henry Anthony, VI, '41 (B.T.E.).**
U. S. Army.
- Skalkas, Basil George, IV, '41 (B.T.C.).**
Corporal, U. S. Army, Climatic Research Laboratory, Lawrence, Mass.
- Skinkle, John Henry, IV, '42 (M.S.). (B.S., Massachusetts Institute of Technology, 1924).**
Assistant Professor, Chemistry Department, Lowell Textile Institute, Lowell, Mass.
- Slamin, Alfred Francis, I, '26 (D).**
Sales Manager, Benjamin Franklin Paint and Varnish Company, Philadelphia, Pa.
- Sleeper, Robert Reid, IV, '00 (D).**
Textile Colorist, Calco Chemical Division, American Cyanamid Company, Bound Brook, N. J.
- Smith, Allen Batterman, I, '26 (D).**
Turner Halsey Company, 40 Worth Street, New York City.
- Smith, Doane White, II, '10 (D).**
15 Oakland Street, Natick, Mass.
- Smith, Francis Dunham, VI, '42 (B.T.E.).**
U. S. Army, Medical Detachment
- Smith, Frank Kenfield, II, '24 (D).**
Superintendent, Grout's, Ltd., St. Catharines, Ont.
- Smith, Harold, IV, '34 (B.T.C.).**
U. S. Army.
- Smith, Herbert Jeffers, VI, '22 (B.T.E.).**
U. S. Ring Traveler Company, Providence, R.I.
- Smith, Lawrence, VI, '40 (M.S.). (B.S., U. S. Naval Academy, 1932).**
Commander, U. S. Navy Supply Officer in Command U. S. Naval Supply Depot, c/o Fleet Post Office, San Francisco, Calif.
- Smith, Ralston Fox, I, '04 (C).**
2600 Norfolk Road, Cleveland Heights, Cleveland, Ohio.
- Smith, Roger Dennis, II, '27 (D).**
Assistant Superintendent, M. T. Stevens & Sons Co. (Pentucket Mills), Haverhill, Mass.
- Smith, Theophilus Gilman, Jr., IV, '10 (D).**
Farming, Groton, Mass.
- Snelling, Fred Newman, II, '03 (D).**
With the American Railway Express Company, Haverhill, Mass.
- Sokolsky, Henry, VI, '17 (B.T.E.).**
Manager, Methods and Standards Dept., B. F. Sturtevant Company, Hyde Park, Mass.
- Somers, Benjamin, II, '25 (D).**
- Sood, George David, IV, '38 (B.T.C.).**
U. S. Army.
- Southwick, Charles Hudson, IV, '22 (B.T.C.).**
Assistant Dyer, Slattersville Finishing Company, Slattersville, R. I.
- Spalding, Arthur Ovila, IV, '32 (B.T.C.).**
Technical Salesman, Sandoz Chemical Works, Inc., New York City.
- Spanos, James Peter, IV, '37 (B.T.C.).**
U. S. Army.
- Spevack, Edward, IV, '39 (B.T.C.).**
Cadet, U. S. Army Air Corps.
- Spiegel, Edward, I, '03 (C).**
- Stacey, Alfred Charles, IV, '30 (B.T.C.).**
Control Chemist, Nashua Gummed & Coated Paper Co., Nashua, N. H.
- Staklinski, Walter Albert, VI, '42 (B.T.E.).**
- Standish, John Carver, IV, '11 (D).**
Vice President, Albany Felt Company, Albany, N. Y.
- Stanley, John Prince, IV, '29 (B.T.C.).**
Chemist, Mohawk Carpet Mills, Inc., Amsterdam, N. Y.

- Stass, John George, II, '27 (D).**
Manager-Chief Technician, Better Fabrics Testing Bureau, Inc., 101 West 31st Street, New York City.
- Steadman, Frank M., VI, '39 (M.S.). (B.S., U. S. Military Academy, 1929).**
Lieutenant-Colonel, U. S. Army, Director of Research & Development, Quartermaster Depot, Philadelphia, Pa.
- Stearns, Kenneth Lawrence, IV, '33 (B.T.C.).**
Dyeing Department, Merrimack Manufacturing Company, Lowell, Mass.
- Steele, Everette Vernon, IV, '24 (B.T.C.).**
Lieutenant, USNR, Bureau of Aeronautics, Washington, D. C.
- Stein, William Joseph, VI, '35 (B.T.E.).**
Executive, Milton C. Blum, Inc., New York, N. Y.
- Steinberg, Sidney, VI, '39 (B.T.E.).**
Corporal, U. S. Army.
- Stephens, Arnold George, I, '29 (D).**
Sergeant, U. S. Army Air Corps, Crew Chief. Overseas.
- Stevens, Raymond Russell, IV, '19 (B.T.C.).**
Chief Chemist, The Felters Company, Inc., Millbury, Mass.
- Stevens, William Edwin, I, '34 (D).**
With B. B. & R. Knight Corporation (Royal Mill), River Point, R. I.
- Stevenson, Murray Reid, III, '03 (C).**
- Stewart, Alexander, VI, '31 (B.T.E.).**
Industrial Relations Director, Goodall-Sanford, Inc., Sanford, Maine.
- Stewart, John Weeden, IV, '30 (B.T.C.).**
New England Representative, Aqua Sec. Corp., New York, N. Y.
- Stewart, Walter Lawrence, III, '03 (D).**
- Steigler, Harold Winfred, IV, '18 (B.T.C.). (M.S., 1922, Ph.D., 1924, Northwestern University.)**
Major, U. S. Chemical Warfare Service, Washington, D. C.
- Stohn, Alexander Charles, III, '06 (C).**
Factory and Production Manager, Carl Stohn, Inc., East Taunton, Mass.
- Stolzberg, Howard Nathaniel, IV, '35 (B.T.C.).**
Chemist, Selenium Rectifiers, General Electric Company, Lynn, Mass.
- Stone, Ira Aaron, IV, '09 (D).**
Vice-President, Riverside Mills, Augusta, Ga.
- Storer, Francis Everett, II, '07 (D).**
Meredith, N. H.
- Storey, Alvin Briggs, VI, '28 (B.T.E.).**
Superintendent of Textiles, Celanese Corporation of America, Cumberland, Md.
- Stott, John Smith, III, '28 (D).**
With Newmarket Manufacturing Company, Lowell, Mass.
- Stowell, Eldon, A. B., I, '39 (D).**
Lieutenant (j.g.), U. S. Coast Guard Reserve.
- Stromvall, Ernest Malcolm, Jr., IV, '44 (B.T.C.).**
U. S. Army, c/o Postmaster, New York, N. Y.
- Stronach, Irving Nichols, IV, '10 (D).**
Superintendent, Hampton Company, East-hampton, Mass.
- Strout, Kenneth Edward, III, '28 (D).**
Designer, United Elastic Corp., New Haven, Conn.
- Sturtevant, Albert William, IV, '17 (D).**
Foreman, Lowell Motor Sales, Inc., Lowell, Mass.
- Sturtevant, Fred William, IV, '26 (B.T.C.).**
Project Supervisor, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.
- Suhle, Waldo Eric, IV, '20 (B.T.C.).**
Teacher, Jefferson Junior High School, Meriden, Conn.
- Sullivan, John David, VI, '12 (D).**
With Robert Gair Company, Bradford, Mass.
- Sullivan, Lambert William, II, '23 (D).**
Boatswain Mate, 1st Class, U. S. Coast Guard, Receiving Station, Boston, Mass.
- Sullivan, Paul Henry, IV, '43 (B.T.C.).**
U. S. Army, c/o A.P.O., New York, N. Y.
- Sullivan, Paul John, IV, '41 (B.T.C.).**
Captain, U. S. Army, c/o Post Master, New York, N. Y.
- Sullivan, Willard David, II, '23 (D).**
Breen's Store, Lowell, Mass.
- Sunbury, Herbert Ellsworth, VI, '18 (B.T.E.).**
Asbestos Sales Manager, U. S. Rubber Co., New York, N. Y.
- Sung, Harvey Chih, VI, '37 (B.T.E.).**
7 Min. Yuan Hsi Li, Colombo Road, Tientsin, China.
- Sutcliffe, Henry Mundell, II, '25 (D).**
Assembler, Norton Co., Worcester, Mass.
- Sutton, Leslie Emans, I, '17 (D).**
Manager, Anniston Cordage Company, Anniston, Ala.
- Swain, Harry LeRoy, Jr., I, '26 (D).**
Purchasing Department, Firestone Tire & Rubber Co., Akron, Ohio.
- Swan, Guy Carleton, II, '06 (D).**
Chief Chemist and Assistant to Chief, U. S. Food and Drug Administration, 201 Varick Street, New York City.
- Swanson, John Harold, I, '28 (D).**
Superintendent, Dundee Mills, Inc., Griffin, Ga.
- Sweat, Safford Pershing, IV, '40 (B.T.C.).**
Captain, U. S. Army. Overseas.
- Sweeney, George Hamilton, II, '24 (D).**
Salesman, Walker Stetson Company, 147 Essex Street, Boston, Mass.
- Swiatek, Bronislaw John, VI, '40 (M.S.). (B.S., Tri-State College, 1938.)**
U. S. Army.
- Swift, Rev. Edward Spooner, S.J., I, '02 (D).**
Administrator, Campion Hall, Jesuit House of Retreats, North Andover, Mass.
- Syme, James Francis, II, '00 (D).**
West Yarmouth, Mass.
- Symmes, Dean Whiting, IV, '22 (B.T.C.).**
Salesman and Demonstrator, National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston, Mass.
- Szopa, Stanley, IV, '42 (B.T.C.).**
Lieutenant (j.g.), USNR.
- Szymoszek, Frank John, IV, '41 (B.T.C.).**
Lieutenant, U. S. Navy.

T

- Tamulonis, Edward William, VI, '30 (B.T.E.).**
Lieutenant, U. S. Army.
- Tang, Hsiung-Yuan, I, '30 (D).**
- Tarpey, Thomas Joseph, IV, '27 (B.T.C.).**
23 Fremont Street, Somerville, Mass.
- Tarshis, Elias Aaron, IV, '28 (B.T.C.).**
Treasurer, Silver Line Dye Works, Inc., New York, N. Y.
- Tartikoff, Jordan Alvin, VI, '41 (B.T.E.).**
U. S. Army, A. C. Detachment, Chanute Field, Rantoul, Ill.
- Taylor, William Warren, VI, '43 (B.T.E.).**
Lieutenant (j.g.), USNR.
- Teague, Charles Baird, II, '26 (D).**
U. S. Navy, Warrant Officer, Civil Engineer Corps.
- Teichner, Arthur Charles, IV, '43 (B.T.C.).**
U. S. Army.
- Thaxter, Joseph Blake, II, '12 (D).**
Ludlow Manufacturing & Sales Corporation, 211 Congress Street, Boston, Mass.
- Thayer, Walter Stephen, VI, '40 (B.T.E.).**
- Thomas, Benjamin, Jr., VI, '34 (B.T.E.).**
Superintendent, Rayon Division, Jackson Mills, Nashua, N. H.
- Thomas, Donald Henry, IV, '42 (B.T.C.).**
Assistant Dyer, National Aniline Division, Allied Chemical & Dye Corp., Buffalo, N. Y.
- Thomas, Henry Edward, VI, '40 (B.T.E.).**
Engineering Draftsman, C. G. Sargent's Sons Corp., Granitville, Mass.
- Thomas, Robert Joseph, IV, '34 (B.T.C.). (M.S., 1937, Ph.D., 1939, University of Notre Dame.)**
Research Chemist, Technical Laboratory, E. I. du Pont de Nemours & Company, Inc., Deepwater, N. J.
- Thomas, Roland Vincent, I, '05 (C).**
With Chicopee Sales Corporation, 40 Worth Street, New York City.
- Thompson, Arthur Robert, Jr., IV, '22 (B.T.C.).**
Salesman, Ciba Company, Inc., Charlotte, N. C.
- Thompson, Everett Leander, I, '05 (D).**
53 Morse Avenue, Brockton, Mass.

- Thompson, George Robert, IV, '35 (B.T.C.).**
Research Chemist, American Association of Textile Chemists & Colorists, Lowell Textile Institute, Lowell, Mass.
- Todd, Walter Ernest, III, '23 (D).**
Agent, Metropolitan Life Insurance Company, Uxbridge, Mass.
- Toepler, Carl, IV, '22 (B.T.C.).**
Superintendent of Permanent Finish Department, Bellman Brook Bleachery Company, Fairview, N. J.
- Toher, Francis Luke, IV, '32 (B.T.C.).**
- Topjian, Leon, IV, '30 (B.T.C.).**
416 Massachusetts Avenue, Boston, Mass.
- Toshach, Reginald Alexander, II, '11 (D).**
Proprietor, Toshach's, Haverhill, Mass.
- Toupin, Stephane Frederick, VI, '24 (B.T.E.).**
Director of Textile Education, Arts & Crafts School Schools, Montreal, Que.
- True, William Clifford, II, '22 (D).**
Assistant Superintendent, Padlow Manufacturing & Sales Co., Allentown, Pa.
- Turcotte, David Henry, IV, '33 (B.T.C.).**
Salesman, Bradt Bakery, Lowell, Mass.
- Turner, George Robert, IV, '41 (B.T.C.).**
Chemist, E. I. du Pont de Nemours & Co., Deepwater Point, N. J.
- Tyler, Bernard James, IV, '36 (B.T.C.).**
Technical Director, Albi Chemical Corp., New York, N. Y.
- Tyler, Lauriston Whitcombe, II, '16 (D).**
Manager, W. T. Grant Company, Brunswick, Maine.
- Tyrie, Wallace Rolley, IV, '43 (B.T.C.).**
With General Electric Company, Plastic Division, Pittsfield, Mass.
- U
- Urlaub, George Samuel, IV, '41 (B.T.C.).**
'42 (M.S.).
Second Lieutenant, U. S. Army Air Corps, Maintenance Engineer.
- V
- Valente, Louis Joseph, VI, '43 (B.T.E.).**
U. S. Army.
- Valentine, Burnet, VI, '23 (B.T.E.).**
Vice-President, Moraff Craig Co., Inc., and Manager Cotton Goods, A. D. Juilliard & Co., Inc., New York, N. Y.
- Valentine, Preston Sumner, IV, '36 (B.T.C.).**
Assistant Chemist, American Safety Razor Corporation, Brooklyn, N. Y.
- Valvanis, Nicholas John, IV, '40 (M.S.). (B.S.)**
Massachusetts State College, 1939.)
U. S. Army.
- Vaniotis, Socrates Vasilios, IV, '37 (B.T.C.).**
Colorist-Experimental Padder Research, Sidney Blumenthal & Co., Inc., Shelton, Conn.
- Varnum, Arthur Clayton, II, '06 (D).**
U. S. Textile Inspector, Quartermaster Depot, Boston, Mass.
- Villa, Luis Jorge, IV, '25 (B.T.C.).**
With Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia, S. A.
- Villa, William Horace, VI, '24 (B.T.E.).**
Technical Director, Fabrica de Hilados y Tejidos del Hato, Medellin, Colombia, S. A.
- Villeneuve, Maurice Arthur, II, '26 (D).**
Corporal, U. S. Army, c/o Postmaster, New York, N. Y.
- Vincent, William Henry, III, '26 (D).**
18 Albion Street, Hyde Park, Mass.
- W
- Wagner, George Frederic, Jr., VI, '38 (B.T.E.).**
Superintendent, Gonie Mfg. Co., Gonie, N. H.
- Walen, Ernest Dean, VI, '14 (B.T.E.).**
Vice-President, Pacific Mills, Worsted Division, Lawrence, Mass.
- Walker, Alfred Schuyler, II, '11 (D).**
67 Park Avenue, Saranac Lake, N. Y.
- Walker, Anna Gertrude, IIIb, '03 (C).**
See Pradel, Mrs. Alois J.
- Walker, Raymond Scott, II, '23 (D).**
Industrial Engineer, Ernst & Ernst, Boston, Mass.
- Walker, Samuel J., IV, '32 (B.T.C.).**
Lieutenant (j.g.), USNR.
- Wall, James Thomas, II, '43 (D).**
Lieutenant, U. S. Army Air Corps, Radio Instructor, Abilene, Texas.
- Wallace, Joseph Max, IV, '31 (B.T.C.).**
Chief Chemist, Alaska Chem. Corp., Paterson, N. J.
- Walwood, John Thomas, IV, '44 (B.T.C.).**
U. S. Army.
- Wang, Chen, IV, '23 (B.T.C.).**
- Wang, Cho, VI, '23 (B.T.E.).**
- Wang, Tung Chuan, VI, '23 (B.T.E.).**
- Wang, Yun-Cheng, VI, '31 (B.T.E.).**
Assistant Manager, Sung Sing Cotton Mill No. 1, Shanghai, China.
- Wang, Yung Chi, II, '21 (D).**
Pu Yi Silk Weaving Factory, Chiating, Szechuen, China.
- Ward, George Chester, IV, '28 (B.T.C.).**
Research Chemist, Celanese Corporation of America, Cumberland, Md.
- Warren, E. Maybelle, IV, '28 (B.T.C.).**
See McBee, Mrs. Damon F.
- Warren, Philip Hamilton, II, '05 (D).**
Superintendent, Hopeville Manufacturing Company, Worcester, Mass.
- Washburn, John Milton, Jr., IV, '21 (B.T.C.).**
New England Manager, Emery Industries, Inc., 187 Perry Street, Lowell, Mass.
- Watson, William, III, '11 (D).**
Real Estate, Frank E. Watson, Merrimack Street, Haverhill, Mass.
- Webb, Ralph Peabody, VI, '42 (B.T.E.).**
Assistant Overseer, Nashua Blanket Company, Jackson Mill, Nashua, N. H.
- Webber, Arthur Hammond, IV, '01 (D).**
Research, B. B. Chemical Co., Cambridge, Mass.
- Weber, Alfred Julius, II, '43 (D).**
Corporal, U. S. Army Air Corps, c/o Postmaster, New York, N. Y.
- Webster, Joseph Albert, VI, '23 (B.T.E.).**
Production Manager, Textron, Inc., Manchester, N. H.
- Weil, Clarence Bernard, IV, '41 (B.T.C.).**
Ph.M. 2/c, U. S. Navy Hospital Staff.
- Weinbeck, Mrs. John C. (Robbins, Lucy W.), VI, '37 (B.T.E.).**
102 South Loring Street, Lowell, Mass.
- Weinstein, Edward Joseph, VI, '25 (B.T.E.).**
Harrison Hardware Company, Harrison, N. Y.
- Welch, William Paul, Jr., IV, '36 (B.T.C.).**
Quartermaster Corps, Jeffersonville, Ind.
- Wells, Ai Edwin, VI, '20 (B.T.E.). (Ed.M. 1937, Boston University.)**
Assistant Professor, Textile Engineering Department, Lowell Textile Institute, Lowell, Mass.
- Wells, Henry Alfred, Jr., IV, '33 (B.T.C.).**
Manager, Scrap Control Division, Wright Aeronautical Corporation, Paterson, N. J.
- Westaway, John Chester, VI, '28 (B.T.E.).**
Secretary-Treasurer, W. J. Westaway Co., Ltd., Hamilton, Ont., and Vice-President, Sonoco Products Company of Canada, Ltd., Brantford, Ont.
- Westbrooke, Clayton Collington, IV, '29 (B.T.C.).**
Chemist, Bigelow-Sanford Carpet Company Thompsonville, Conn.
- Wetherbee, Francis Putney, I, '28 (D).**
Vice-President and Manager, Flint River Cotton Mills, Albany, Ga.
- Wheaton, Walter Francis, VI, '23 (B.T.E.).**
Salesman, P. F. Volland Company, Joliet, Ill.
- Wheelock, Silas Mandeville, Jr., II, '39 (D).**
Lieutenant, U. S. Army, c/o Postmaster, San Francisco, Calif.
- Wheelock, Stanley Herbert, II, '05 (D).**
President and Treasurer, Stanley Woolen Company, Uxbridge, Mass.
- Whitcomb, Roscoe Myron, IV, '10 (D).**
Druggist, The Rexall Store, Ashland, N. H.

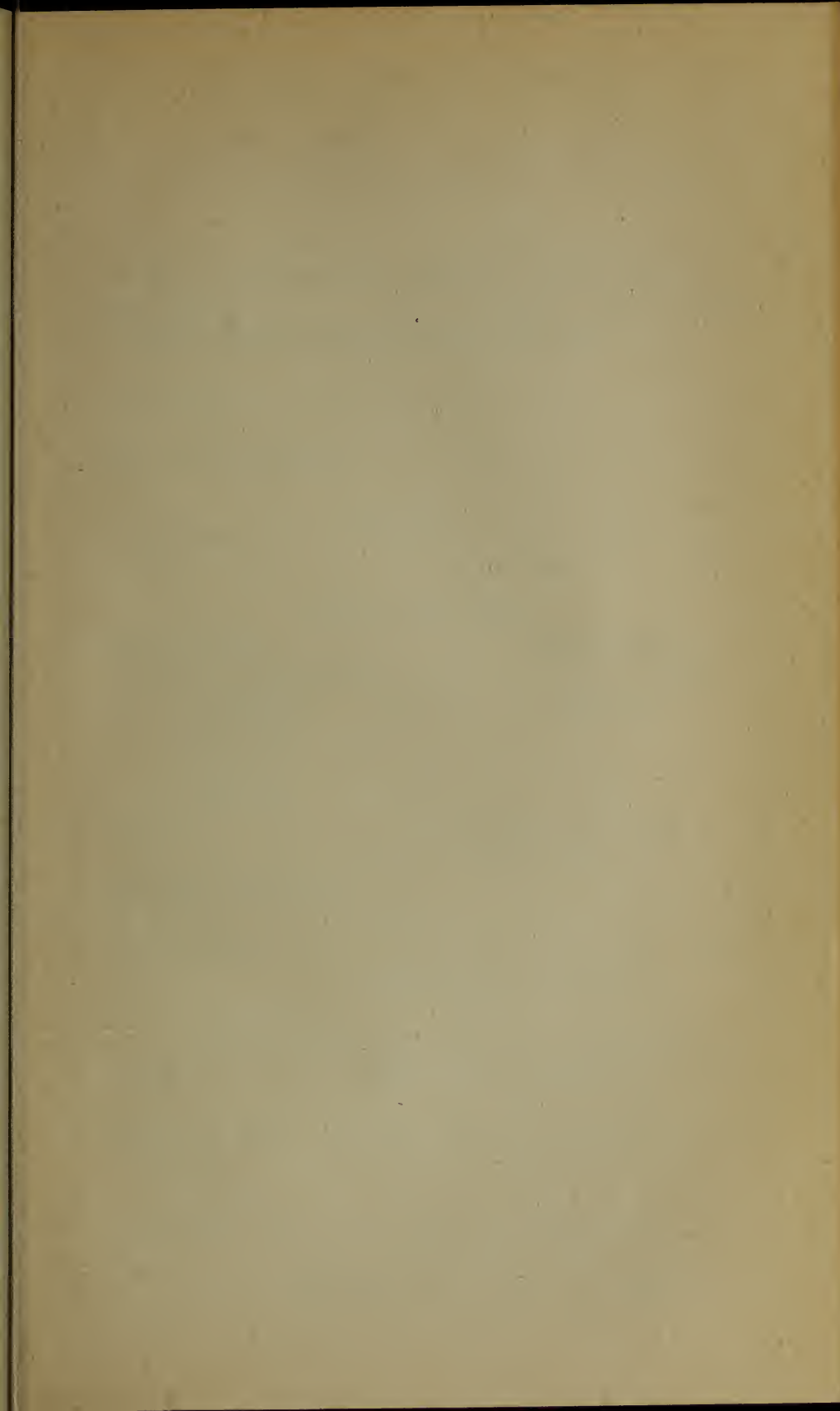
- White, Royal Philip, II, '04 (D).
Resident Manager, American Woolen Company, Sawyer Mills, Dover, N. H.
- Whitehill, Warren Hall, IV, '12 (D).
Overseer, Pacific Mills, Worsted Department, Lawrence, Mass.
- Whiting, Mrs. Frank E. (Macdonald, Barbara T.), III, '43 (D).
310 Wilson Avenue, Rumford, R. I.
- Wiech, Raymond Edward, IV, '29 (B.T.C.).
- Wiesner, Arthur Charles, II, '39 (D).
U. S. Army.
- Wightman, William Henry, IV, '06 (D).
Technical Salesman, Ciba Company, Inc., Boston, Mass.
- Wilcox, Leonard Edward, VI, '24 (B.T.E.).
179 Varnum Avenue, Lowell, Mass.
- Wilkie, Robert Campbell, VI, '34 (B.T.E.).
Research Engineer, Pacific Mills, Worsted Division, Lawrence, Mass.
- Wilkinson, Herbert William, Jr., IV, '37 (B.T.C.).
Technical Director, Southbridge Finishing Company, Southbridge, Mass.
- Wilkinson, Vernon Lee, I, '42 (D).
Lieutenant, A.A.F.
- Williams, Albert William, III, '32 (D).
Production Manager, L. W. Guild Co., Inc., Boston, Mass.
- Williamson, Douglas Franklin, I, '22 (D).
Manager, Lavonia Manufacturing Co., Lavonia, Ga.
- Willman, Rodney Bernhardt, II, '25 (D).
Superintendent, New England Fibre Blanket Company, Worcester, Mass.
- Wilson, Raymond Bachman, II, '36 (D).
Overseer, Rochambeau Worsted Company, Providence, R. I.
- Wing, Charles True, III, '02 (D).
Paymaster, M. T. Stevens & Sons Company, Dracut, Mass.
- Wingate, William Henry, IV, '08 (D).
Instructor, Bradford-Durfee Textile School, Fall River, Mass.
- Winkler, Burton Cole, IV, '39 (B.T.C.).
Head Dyer, Waverly Piece Dye Works, Elizabeth, N. J.
- Wise, Paul Tower, II, '01 (D).
President, Chelsea Fibre Mills, 1155 Manhattan Avenue, Brooklyn, N. Y.
- Wojas, Stanley Edward, IV, '33 (B.T.C.).
Pfc., U. S. Army, Missing in action in Germany.
- Wolf, Irving Jacob, VI, '41 (B.T.E.).
Ensign, USNR.
- Wolf, Irving Paul, IV, '42 (B.T.C.).
Chemist, Schwarz Laboratories, Inc., New York, N. Y.
- Woo, Tsunkwei, VI, '19 (B.T.E.).
- Wood, Ernest Hadley, S.B., IV, '11 (D).
- Wood, James Carleton, IV, '09 (D).
Sales Representative, R. T. Vanderbilt Company, New York City.
- Wood, Lawrence Burnham, IV, '17 (B.T.C.).
Chemist, Arkwright Finishing Corporation, Fall River, Mass.
- Woodard, Alice M., VI, '41 (B.T.).
See Lane, Mrs. Joseph J., 2nd.E.
- Woodard, Malcolm Russell, IV, '40 (B.T.C.).
Sergeant, U. S. Army Air Corps, Aerial Photography, c/o Postmaster, New Orleans, La.
- Woodbury, Kenneth Leroy, VI, '28 (B.T.E.).
Assistant Comptroller, Sidney Blumenthal & Company, Shelton, Conn.
- Woodcock, Eugene Close, II, '07 (D).
Manager, Jute Yarn Department, Ensign Bickford Company, Simsbury, Conn.
- Woodhead, Joseph Arthur, VI, '23 (B.T.E.).
Supervisor, Technical Service Division, Research and Development Department, Colgate-Palmolive-Peet Company, Jersey City, N. J.
- Woodies, Ida Alberta, IIIB, '00 (C).
See Shanauquet, Mrs. Lee.
- Woodman, Harry Lincoln, I, '02 (C).
Salvage Foreman, Monsanto Chemical Company, Merrimack Division, Everett, Mass.
- Wormwood, Herbert Alvin, IV, '36 (B.T.C.).
C/Sgt., U. S. Army. Overseas.
- Worthen, Clifford, Tasker, IV, '22 (B.T.C.).
Dyer, F. C. Huyck & Sons, Kenwood Mills, Albany, N. Y.
- Wotkowicz, Michael Joseph, VI, '20 (B.T.E.).
- Wright, Edward, II, '05 (C).
Sanitary Engineer, Massachusetts Department of Public Health, 511A State House, Boston, Mass.
- Wright, George Ward, IV, '38 (B.T.C.).
Consulting Chemist, F. S. Bacon, Watertown, Mass.
- Wu, Clarence Wen-Lon, VI, '25 (B.T.E.).
Northwestern College of Technology, Chenkuo, Shensi, China.
- Wu, Tsung-Chieh, VI, '25 (B.T.E.).
- Wynn, William Joseph, Jr., IV, '34 (B.T.C.).
Superintendent of Dyeing and Finishing, Lawrence Woolen Company, Lawrence, Mass.

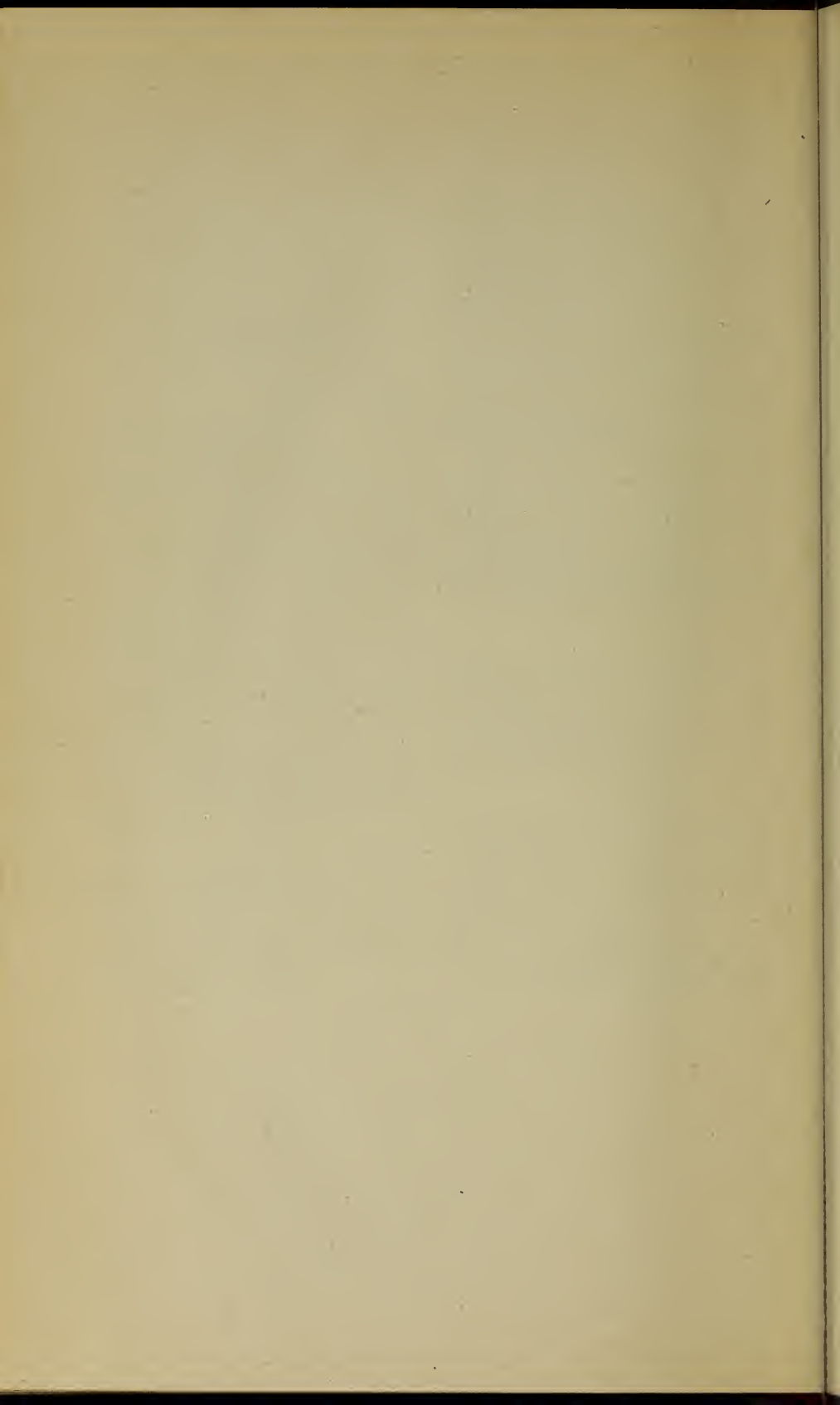
Y

- Yacubian, Gamaliel Mardiros, II, '40 (D).
U. S. Navy.
- Yavner, Harry, II, '12 (D).
Merchant, Mayo's Hardware Company, Jamaica Plain, Mass.
- Young, Edmund Joseph, Jr., IV, '33 (B.T.C.).
545 School Street, Lowell, Mass.
- Yung, E-Zung, I, '32 (D).

Z

- Zalkind, Benjamin Joseph, VI, '29 (B.T.E.).
Textile Engineer, Saco-Lowell Shops, Biddeford, Maine.
- Zellweger, Ralph John, VI, '41 (B.T.E.).
Lieutenant, USNR, c/o Fleet Post Office, San Francisco, Calif.
- Zenorini, Henry John, VI, '43 (B.T.E.).
U. S. Army Air Corps.
- Ziock, LeRoy, II, '25 (D).
President, Ziock Industries, Inc., Rockford, Ill.
- Zisman, Louis Samuel, IV, '20 (B.T.C.).
Consulting Chemist and General Manager, Fabric Chemicals Company, Jersey City, N. J.





LOWELL TEXTILE INSTITUTE

APPLICATION FOR ADMISSION

THIS SHOULD BE FILLED OUT AND SENT TO THE REGISTRAR

Date.....

I hereby apply for admission to the Lowell Textile Institute for the term beginning, 19..... If admitted, I agree to comply with all the regulations set by the Trustees and Faculty.

Name in Full.....

Date and Place of Birth.....

Home Address {
City or Town State
.....
Street and Number

INDICATE COURSE DESIRED

DEGREE COURSES

- IV. Chemistry and Textile Coloring
- VI. Textile Engineering
 - 1. General Course
 - 2. Cotton Option
 - 3. Wool Option
 - 4. Design Option
 - 5. Sales Option

DIPLOMA COURSES

- I. Cotton Manufacturing
- II. Wool Manufacturing
- III. Textile Design

Graduate of.....High School, Year 194.....

Other High or Preparatory
Schools attended.....19.....—19.....

Collegiate work at.....19.....—19.....
Give name and address of College or University

Signature.....

I approve the above application of my ^{son} daughter and agree to be responsible for ^{his} her tuition and other costs:

Signatures of Father.....

and Mother.....

or Guardian.....

Citizen of.....
City or Town State

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BULLETIN

of the

Lowell Textile Institute

LOWELL, MASS.

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1945-1946

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under act of Congress of July 16, 1894.

Moody Street and Colonial Avenue

DEPARTMENT OF
LOWELL EVENING TEXTILE SCHOOL

TRUSTEES OF THE LOWELL TEXTILE INSTITUTE

Officers.

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ROLAND E. DERBY, *Vice-Chairman*

CHARLES H. EAMES, *Clerk*

On the Part of the Commonwealth of Massachusetts

JULIUS E. WARREN, *Commissioner of Education*

On the Part of the City of Lowell

HON. WOODBURY F. HOWARD, *Mayor of Lowell*

FOR TERM ENDING JUNE 30, 1945

RICHARD G. CHADWICK, Lowell, Engineer, New England Telephone & Telegraph Company

ROLAND E. DERBY, Lawrence, Proprietor, The Derby Company

HAROLD V. FARNSWORTH, Boston, Textile Engineer, Atkinson, Haserick & Company

STEPHEN R. GLEASON, Lowell, Superintendent, Walter L. Parker Bobbin & Spool Company

J. EMILE LEMIRE, Lowell, Teacher, Lowell High School

FOR TERM ENDING JUNE 30, 1946

HAROLD E. CLAYTON, Lowell, Treasurer and Manager, Clayton Hosiery Mills, Inc.

ALBERT J. GILET, Lowell, Vice-President, Gilet Carbonizing Company, Inc.

HAROLD T. GODFREY, North Andover, Director, Davis & Furber Machine Company

LOUIS G. HAYES, Boston, Union Color & Chemical Company, Boston

WALTER B. FRENCH, Lowell, Manager, Appleton Company

FOR TERM ENDING JUNE 30, 1947

FRANCIS P. MADDEN, Boston, Selling Agent, Cotton Goods, 99 Chauncy Street

HAROLD W. LEITCH, Lawrence, General Superintendent, Worsted Division, Pacific Mills

MYRON S. FREEMAN, Worcester, Vice-President, The Bell Company

MELVILLE WESTON, Lowell, Treasurer, Newmarket Manufacturing Company

JOHN H. GRIFFITH, Lowell, Courier-Citizen Company

LOWELL EVENING TEXTILE SCHOOL

ADMINISTRATION AND FACULTY

CHARLES HOLMES EAMES, S.B.	Billerica.
President.	
EDGAR HARRISON BARKER	9 Mount Hope Street.
Professor Emeritus of Textiles.	
LOUIS ATWELL OLNEY, S.B., M.S., ScD.	118 Riverside Street.
Professor Emeritus of Chemistry	
HERMANN HENRY BACHMANN	146 Parkview Avenue.
Professor Emeritus of Textile Design	
LESTER HOWARD CUSHING, A.B., Ed.M.	10 Walden Street.
Professor of History and Economics; in charge of Department of Languages, History and Economics; Secretary of the Faculty; Director of Athletics and Physical Education.	
HERBERT JAMES BALL, S.B., B.C.S., F.T.I.	34 Pentucket Avenue.
Professor of Textile Engineering; in charge of Department of Textile Engineering and Accountancy.	
GILBERT ROSCOE MERRILL, B.T.E.	364 Varnum Avenue.
Professor of Textiles; in charge of Department of Cotton Yarns and Knitting.	
CORNELIUS LEONARD GLEN	R.F.D. No. 1, Lowell.
Professor of Textiles; in charge of Department of Finishing.	
RUSSELL LEE BROWN, B.T.E., M.S.	59 Bradstreet Avenue.
Professor of Textiles; in charge of Department of Wool Yarns.	
ELMER EDWARD FICKETT, B.S.	162 Hovey Street.
Professor of Chemistry; in charge of Department of Chemistry and Textile Coloring.	
VITTORIA ROSATTO, B.S.	63 Bradstreet Avenue.
Professor of Textile Design; in charge of Department of Design and Weaving.	
STEWART MACKAY	North Chelmsford.
Assistant Professor in Textile Design Department.	
JOHN CHARLES LOWE, B.T.E., M.S.	229 Dracut Street.
Assistant Professor in Wool Department.	
MARTIN JOHN HOELLRICH	30 Saxonia Avenue, Lawrence.
Assistant Professor in Weaving Department.	
HAROLD CANNING CHAPIN, Ph.D.	290 Pine Street.
Assistant Professor in Chemistry and Dyeing Department.	
CHARLES LINCOLN HOWARTH, B.T.C.	North Billerica.
Assistant Professor in Chemistry and Dyeing Department.	
HARRY CHAMBERLAIN BROWN, S.B.	272 Merrimack Street.
Assistant Professor in Textile Engineering Department.	
JAMES GUTHRIE DOW, A.B.	11 Robbins Street.
Assistant Professor in Language Department.	
A. EDWIN WELLS, B.T.E., Ed.M.	37 Ashland Street, Melrose Highlands.
Assistant Professor in Textile Engineering Department.	
JAMES HARRINGTON KENNEDY, Jr., B.T.E., M.S.	(On leave of absence)
Assistant Professor in Wool Department.	
CHARLES FREDERICK EDLUND, B.S., Ed.M.	(On leave of absence)
Assistant Professor in Textile Engineering Department.	
JOHN HENRY SKINKLE, S.B., M.S.	Chelmsford.
Assistant Professor in Chemistry and Dyeing Department.	
HORTON BROWN, B.S.	178 Atlantic Avenue, Marblehead
Assistant Professor in Textile Engineering Department.	
WINFORD SYKES NOWELL, B.M.E.	8 Fulton Street, Methuen.
Assistant Professor in Finishing Department.	
NATHANIEL ERSKINE JONES	19 Maryland Avenue
Assistant Professor in Cotton Department	
CHARLES HARRISON JACK	68 Canton Street.
Instructor in Textile Engineering Department.	
RUTH FOOTE, A.B., S.B.	46 Victoria Street.
Instructor and Registrar.	
RUSSELL METCALF FOX	359 Beacon Street.
Instructor in Textile Design Department.	
CHARLES ARTHUR EVERETT, B.T.C.	Chelmsford.
Instructor in Chemistry and Dyeing Department.	
WILLIAM GEORGE CHACE, Ph.B., M.S.	(On leave of absence)
Instructor in Chemistry and Dyeing Department.	

JOHN LESLIE MERRILL, B.T.E.	2026 Middlesex Street.
Instructor in Weaving Department.	
MILTON HINDLE, B.T.E.	25 Thurston Road, Melrose Highlands.
Instructor in Textile Engineering Department.	
WALDO WARD YARNALL, B.S.	(On leave of absence)
Instructor in Physical Education.	
CHARLES LINCOLN DALEY, B.T.C.	392 Princeton Street.
Instructor in Chemistry and Dyeing Department.	
CARL ARTHUR CARLSON, B.S., M.E.	(On leave of absence)
Instructor in Textile Engineering Department.	
PAUL CHARLES PANAGIOTAKOS, S.B., Ph.D.	290 Branch Street
Instructor in Chemistry and Dyeing Department.	
PAUL DAVID PETTERSON	East Chelmsford.
Instructor in Textile Engineering Department.	
HENRY LELAND PERO, B.T.E.	Chelmsford
Instructor in Wool Department	
ELMER PERCY TREVORS	18 Rhodora Street.
Assistant Instructor in Chemistry and Dyeing Department.	
WALTER BALLARD HOLT	37 Albert Street.
Bursar.	
FLORENCE MOORE LANCEY	46 Victoria Street.
Librarian.	
HELEN GRAY FLACK, S.B.	445 Stevens Street.
Secretary.	
MONA PALMER MACKENZIE	1424 Bridge Street, Dracut.
Clerk.	
THERESA DORA LEBLANC	86 White Street
Clerk.	

CALENDAR—1945

September 20, Thursday	Registration
September 27, Thursday	Registration
October 1, Monday	Opening of evening school
October 12, Friday	Columbus Day—Holiday
November 12, Monday	Holiday—Observance of Armistice Day
November 22–23, Thursday and Friday	Thanksgiving Recess. No classes
December 19, Wednesday	End of first term

1946

January 3, Thursday	Opening of second term
March 1, Friday	Closing of evening school

GENERAL INFORMATION

Entrance Requirements

All applicants to the evening classes must understand the English language and simple arithmetic. Those who are graduates of a grammar or high school are admitted upon certificate. Those who cannot present such a certificate are required to take examination in the subjects of English and arithmetic. In the examination in English a short composition must be written on a given theme, and a certain amount must be written from dictation. In the examination in arithmetic the applicant must show suitable proficiency in addition, subtraction, multiplication, division, common and decimal fractions, percentage, ratio and proportion. Opportunity to register or to take these examinations is offered each year, generally on the Thursday evenings of the two weeks previous to the opening of the evening school.

Registration

Before entering the class a student must fill out an attendance card, which can be obtained at the office or from the instructors in the various departments.

Any student who has filed an attendance card and who wishes to change his course must notify the office before making the change.

Sessions

The evening classes commence the first Monday of October and continue for twenty weeks. The school is open on four evenings each week during the period mentioned, except when the school is closed for holiday recesses.

Supplies

Students must provide their own books, stationery, tools, etc., and pay for any breakage or damage that they cause.

Students' supplies will be sold from the co-operative store every evening school night from 6.45 to 8.15 P.M.

Fees and Deposits

All evening courses are free to residents of Lowell, but students must file a certificate of residence signed and sealed by the city clerk of Lowell. Those who do not file such certificate will be considered non-residents.

To non-residents of Lowell the fee is \$10 per year for *each course of two nights per week*. Students taking two courses or attending courses requiring more than two nights per week are required to pay \$15 per year for three nights and \$20 for four nights.

All fees and deposits must be paid in advance.

All students, whether from Lowell or not, taking Course 411, Chemistry and Dyeing Department, are required to make a deposit at the commencement of the course—\$5 for first-year students, and \$10 for second-year students. A deposit of \$10 will be required of all students taking Course 412, 413 or 414. This is to cover the cost of laboratory breakages, chemicals, apparatus, etc., and at the end of the year any unexpended balance is returned, or an extra charge made for the excess breakage.

All students taking Machine-Shop Practice will be required to make a deposit of \$5. Any unexpended balance remaining at the end of the year will be returned to the student.

Report of Standing

A report of standing covering the year's work is sent to all students who attend the entire year and take the necessary examinations.

Certificates

The courses of the evening school are varied and arranged to meet the special needs of those engaged in the industry. They vary in length from one to four years, and at the completion of each course the certificate of the school is awarded, provided, however, that the student has been in attendance in the course during the year for which the certificate is granted.

GENERAL EVENING COURSES

The object of these courses is to give young men of ambition an opportunity to obtain instruction in all the branches of science that are allied with their daily work. For example, one who is employed as a weaver in a textile mill may obtain knowledge of the manufacture of yarn, the production of a design, and the methods of finishing a fabric, as well as the manner of its weaving or knitting. In like manner the dyer may augment his knowledge of the chemicals and materials he is daily handling. The engineer and machinist may acquire a knowledge of the mathematics, science of mechanics, electricity and drawing that underlie all the work of an engineer.

It is recognized that the interests of such students lie in a particular field of industry, and these courses are designed to bear directly upon the special line, and supplement, as far as possible, the practical work in which the student is engaged during the day.

In a word, any man having a common school education and the ambition to advance in his line may now secure a broad and comprehensive training in the subjects which will be of vital importance to him in obtaining the goal of his ideal.

A description of all courses follows. All courses are held two evenings unless otherwise specified.

COTTON DEPARTMENT

The courses offered in the Cotton Department are intended for those interested in cotton yarn manufacture and sales. In addition to the value for those directly connected with the carding and spinning departments, the courses offer an opportunity for students who are working in the mill office or the selling office. Men selling supplies to cotton mills will find in these courses an opportunity to become acquainted with the business and its problems which will make possible a more complete service to their customers.

111. Cotton Yarns—2 Years

The *first year* work in cotton yarn manufacture includes a study of cotton and its preparation for market, followed by a study of opening, picking, carding and combing. This work consists of lectures on these operations combined with problems that are peculiar to each operation such as the drafts used, the production of each process and the amounts of waste made. Special consideration is given to the adjustment and care of these machines and some laboratory demonstration is used to show the manner of adjusting machines for the purpose of controlling the weight of the product, the amount of work done in a day and the amount of waste made.

Two evenings each week.

COTTON.—This course starts with a study of cotton growing, the areas producing cotton and the characteristics of cottons from the various producing areas. The effects of seed selection, cultivation, and weather conditions on the cotton are emphasized.

Picking and ginning of cotton are studied to show the importance of proper preparation of lint for mill consumption.

There is a general survey of the intricate cotton marketing system, illustrating the methods of specifying cotton desired and securing delivery at a known price.

OPENING AND PICKING.—As this equipment has changed considerably in recent years, special notes are used illustrating modern machinery and its arrangement. Machine parts, construction and adjustment, are discussed in the classroom and demonstrated in the laboratory. Mixing of cottons for colored work or for price control is considered under these processes.

CARDING.—The process of carding is considered one of the most important, and proper time is devoted to the construction and operation of cards that the student may be familiar with the various parts of the card and the function and design of each. The construction and application of card clothing, and the methods of grinding form a part of the work. Some time is given to a discussion of the waste made in carding, the regulation of the amounts of each made and the calculation of the percentages. New and special attachments for various purposes are brought to the attention of the class, illustrating possible ways of improving carding conditions.

COMBING.—The preparation of card sliver for combing by means of the sliver lapper and ribbon lapper is thoroughly considered. The combing operation itself is studied in considerable detail, emphasizing the general object and operations in combing and the specific means employed by various types of combs in performing the operations. The calculations in this connection involve the drafts and doublings necessary to produce the proper lap for the comb, the proper comb drafts, and the determination of the per cent of noil produced.

The *second year* work in cotton yarn manufacture includes a study of the operations of drawing, roving, spinning, winding and twisting. The work consists largely of lectures and problems with some laboratory demonstrations to make the student familiar with the machines and the points of adjustment.

DRAWING.—The instruction on drawing introduces the principles of roller draft and the theory of doublings. Special attention is given to roll covering materials and their application. The measurement of uniformity of slivers by various methods is considered here.

ROVING.—Roving includes the various machines known as the slubber, intermediate, fine and jack fly frames. Each of the various motions of these complicated machines is treated separately and then the group is taken as a unit, tying each operation in with the others. Particular attention is paid to the subjects of lay and tension because of their importance in producing perfect roving. The calculations in this subject involve draft, twist, lay and tension with particular attention to the derivation of constants and their use. The new systems of long draft for roving frames are included in this work.

RING SPINNING.—A study of the various types of yarns gives the student an appreciation of the necessary characteristics for various purposes and how these may be obtained. Standard draft and long draft systems are studied in detail. Important machine parts, such as guides, travelers, rings and builders, their adjustment and care, form an important part of this subject. Yarn faults and defects are shown and their causes explained.

SPOOLING AND WINDING.—The discussions under this head cover the treatment of single yarns in preparation for twisting, comparing the relative merits of spooling with multiple winding on tubes, and beaming for special twistors. Winders are also considered as a means of preparing yarn packages for sale yarns.

TWISTING.—Because of the similarity to ring spinning, the emphasis here is more on the manufacturing part of the work, although there are a few peculiar features of a mechanical nature. The twisting of various regular ply yarns, the making of numerous fancy yarns and the principles underlying the production of various patterns are taken up. The use of special twisters and other apparatus for cords and ropes is considered under this heading.

113. Knitting—1 Year

This is a general course on the manufacture of knitted fabrics and garments, intended for those interested in the principles of knitting and a study of the mechanisms of a variety of knitting machines. The more important phases of the course are:—

YARNS AND YARN SIZING SYSTEMS.—In order that the student may understand the distinctions between yarns, terminology, and the various sizing systems commonly used, several lectures are devoted to yarn characteristics and sizing as a basis for the entire course. This covers cottons, woolens, worsteds, silks and rayons.

FLAT MACHINES.—These relatively simple machines make a fine starting point in establishing clearly the action of the latch needle and how it is operated. Lamb, Dubied, Grosser, and Links and Links machines are used as a basis for this part of the work.

SMALL CIRCULAR RIBBERS.—These machines are a very logical step, following flat machines. Brinton, Wildman, and Universal ribbers, with different pattern mechanisms, are used in illustrating this type of work.

AUTOMATIC HOSIERY MACHINES.—This section of the course is built around the various Banner and the Scott and Williams half and full hose machines. Most of the work is done with the plain machines as there is not sufficient time to include the fancy pattern type.

LARGE RIBBERS AND SPRING NEEDLE MACHINES.—Underwear fabric and webbing

are produced on this type of equipment. Scott and Williams, Wildman, Tompkins and Crane machines are the basis for instruction along these lines.

FULL FASHIONED MACHINE.—A brief study of the full fashioned principles and actions is based on the Reading 18-section machine in the laboratory.

WARP KNITTING.—Using the Raschel machine in the laboratory, a general study of warp knitting includes Tricot and Milanese work also.

ANALYSIS.—During the study of the various machines, considerable attention is given to the many "stitches" possible. This, coupled with the lectures on fabric and hosiery analysis, covers the common analysis problems.

ROUTINES.—The usual sequence of manufacturing processes for hosiery and underwear are studied with the idea of illustrating the steps necessary in producing different articles.

Most of the instruction in this course is given by lectures. As many of these machines are small, it is common practice to bring the machine under discussion into the classroom so that students may see the machine and parts being considered. In other instances, the class may go into the laboratory to see the equipment and its operation.

114. Cotton Organization—1 Year

This course, offered only to those who have completed the work in Carding and Spinning, is a study of the common arrangements of drafts, sizes and production details for manufacturing various cotton yarns. Illustrative problems demonstrate how to provide for "balancing" a mill or how to divide equipment to produce different yarns in given quantities.

Some time is devoted to discussing various common machinery layouts and the number of operatives required for certain manufacturing arrangements. Typical mill job analysis problems involving time study and end breakage tests are considered.

WOOLEN AND WORSTED DEPARTMENT

211. Woolen Yarns—1 Year

Instruction consists of lectures covering all details of woolen yarn manufacture. This covers all the operations in detail necessary to manufacture yarns from raw stock on the woolen principle, and includes lectures and laboratory work on burr picking, wool blending, mixing, picking, wool oils and emulsions, carding, spinning on both mule and ring frame, and plain and novelty twisting.

Reworked fiber and wool waste is covered in detail from rag sorting to finished staple.

217. Wool and Top Making—1 Year

Instruction consists of lectures in technology of wool fibers and worsted carding and combing.

RAW MATERIALS.—The study of raw materials which enter into the manufacture of woolen or worsted yarns or hardened felts, or are made into yarns by processes similar to those employed in the manufacture of woolen and worsted yarns, includes silk, mohair, alpaca, vicuna, cashmere, camel hair, cut staple rayon, etc. In connection with these are considered shoddy, noils, and extracts.

WOOL SORTING.—Familiarity with the various grades and kinds of wool is obtained by lectures. The various characteristics and properties are explained, as are also trade terms, such as Fine, $\frac{1}{2}$ -blood, $\frac{3}{8}$ -blood, 56^s, 36^s, B super, delaine, braid, etc. Over 1,500 samples of wool and other fibers gathered from all the countries of the world are catalogued and are available for inspection and study. Wool shrinkages are studied as are also spinning qualities. A complete collection of literature pertaining to sheep, wool, etc. is available for outside reading or study.

WOOL SCOURING.—The objects of scouring or degreasing and the methods employed are explained. This involves the consideration of soaps and chemicals used in scouring and degreasing, also the waste products and their utilization. A sorted lot of grease wool is scoured by machines that are made similar in operation to regular commercial wool scouring machines. At the same time the use of driers, their operation and regulation, is taken up.

CARBONIZING.—The methods of carbonizing wool, noils, burr waste, rags, etc. are studied. If time permits, a commercial quantity of stock is carbonized on the regulation carbonizing machines in the wool laboratory.

CARDING.—The different types of worsted cards are studied in detail, as well as the construction, setting and operation of cards. A part of this work consists of a study of card clothing, its construction, application, grinding, setting, etc.

COMBING.—This branch takes up the preparing processes, backwashing, also gilling of the stock before and after combing. The construction of the gill boxes and Noble comb is studied by lectures. Two Noble combs are available for inspection and study.

The French comb is studied, and the various calculations to determine draft, noiling, productions, etc., are made.

218. Worsted Yarns—1 Year

Instruction is devoted to detail study of the English and French systems of worsted yarn manufacture.

DRAWING AND SPINNING.—The equipment in the laboratory offers opportunity to make worsted yarn by either the Bradford or open drawing system or by the French system. The process includes the various machines in the successive steps of making Bradford spun yarn, and the functions of the different machines are studied. In the latter, or French system, the stock is run through the drawing machines, and the roving spun into yarn on the worsted mule or frame. The same method of studying the mechanism and operations of these machines is followed as in the case of previous methods of instruction. The student by pursuing this course can compare the different methods of yarn manufacture and note the results of each.

With the instruction in spinning by the Bradford system is given work on the twistors and the effects that may be produced.

TEXTILE DESIGN AND WEAVING DEPARTMENT

311. Cotton Design—3 Years

During the *first year* instruction is given in elementary designing, starting with all the foundation weaves which may be used in fabrics such as the plain weave, rib weaves, basket weaves, twill weaves, satin weaves, granite weaves, etc. Combination and derivative weaves are made up from the aforesaid weaves. Fancy and figured weaves, in most cases originated by the student, are produced. Color effects, which are so essential in fabrics, obtainable from the different weaves, as stated above, in which the color arrangement of warp and filling create the pattern, are thoroughly considered. Not only the designing, but also harness drafting and the making of dobby chains for all type of weave is taken up.

Cloth analysis is considered in conjunction with designing, as a designer must know the kind of fabric he is designing, what material and what size of yarns are to be used, and how heavy and costly the cloth is to be. The various topics discussed are the sizes or counts of yarns made from all kinds of fibers, such as cotton, woolen, worsted, silk, rayon, jute and yarns of other vegetable fibers. Their relative length to the pound is determined in the single two or more ply, mixed yarns, novelty yarns and fancy yarns, in the American or English system. The same is given in the metric system. Problems involving the take-up of yarns in the weaving and finishing process are given. Samples of cloth are picked apart to determine their weaves and general construction.

In the *second year* cloth analysis and design are combined in lecture and practice, starting with plain and leading into the more fancy cotton dobby fabrics. A great variety of samples of cloth are used in class work to determine ends and picks per inch, shrinkage in warp and filling, and the number of reed and reed widths necessary for eventual reconstruction. The yarn numbers of warp and filling are determined by aid of fine balances. The amount of warp and filling necessary for a piece of goods is calculated and the weight of a whole piece as well as the number of yards per pound are determined.

In the *third year* more elaborate cloths are considered, both in designing and analysis, cloths in which extra warp or extra filling, or both, are used. Warp backed, filling backed, double, triple or more plied fabrics are taken up, such as

marseilles, quilting, pique, suspenders, narrow webbings, velveteens, fancy velveteens, velvets, corduroys, Bedford cords, plushes, leno, in fact, anything a student may suggest which might help him in his work.

312. Woolen and Worsted Design—3 Years

This course covers the design and analysis of standard woolen and worsted fabrics and is intended for those who wish to specialize in this branch of textile fabric manufacture. Special and fancy fabrics are studied to the extent that time will permit.

During the *first year* instruction is given in the subject of classification of fabrics, use of points or design paper, plain fabrics, intersection, twills and their derivation, sateen, basket and rib weaves, checks and stripes, fancy weaves, including figured and colored effects; producing chain and draw from design, and *vice versa*; extending and extracting weaves.

The analysis of samples is taken up in a systematic manner, illustrating the various cloth constructions for the purpose of determining the design of the weaves and the amount and kind of yarns used, and forms the basis of calculation in the cost of reproducing any style of goods. The various topics discussed are reeds and setts; relation and determination of counts of cotton, woolen, worsted, silk and yarns made from the great variety of vegetable fibers; grading of yarns, folded, ply, novelty and fancy yarns; application of the metric system to yarn calculation; problems involving take-up, average counts, determination of counts of yarn, and weight of yarn required to produce a given fabric.

During the *second year* instruction is given in cotton warp goods, blankets, bath robes, filling reversible, extra warp and filling backs, figured effects produced by extra warp and filling, double cloths and plaid backs.

The analysis work follows as closely as possible the type of fabrics taken up in the designing and the reconstruction of these fabrics with the consideration of their shrinkage and composition.

In the *third year* instruction is given in multiple fabrics, chinchilla, Bedford cords, crepon, matelasse and imitations, double plains, meltons, kersey, plush and suitings. At this time also is taken up the construction of designers' blankets, suggestion cards, and the construction of samples.

The construction of new fabrics from theoretical viewpoint together with the construction from suggestion cards is taken up. In connection with this work instruction is given in making cost estimates for both woolen and worsted fabrics.

313. Decorative Art—3 Years

During the first ten weeks the work consists of charcoal drawing from plaster models and group arrangements of still life. The second ten weeks deals with pastel drawing of still life groups, depending upon the progress and interest of the students.

Two evenings each week.

During the second year instruction is given in figure drawing from the model.

Two evenings each week.

In the third year the student chooses one of the following options:

1. Color Harmony—its mixes and uses.
2. Perspective—a mechanical method of correct drawing.

314. Show Card Design—2 Years

LETTERING.—During the *first year* the student is taught to master the drawing, with pencil, of a few very plain alphabets, both upper and lower case letters, also plain figures. With the characteristics of plain letter alphabets well in mind, it is but a few steps to make any of the more intricate ones. Following this he will make simple "lay-outs" of plain card signs, and then take up the lettering, with brush and paint, of some of his simple card designs.

The *second year* is simply a continuation of the latter part of the first year work, with the addition of advanced design in the "lay-out" and color-scheme of practical show cards and posters, such as are designed and lettered in the up-to-date Show Card Shop of to-day.

316. Pattern Alteration—1 Year

This includes a general understanding of the alteration of the commercial pattern as well as alterations for the student's own figure problems.

321. Cotton Weaving—1 Year

The Course in Cotton Weaving covers instruction on plain looms, Draper Automatic and Stafford Automatic looms. It includes instruction on the construction of shedding and picking motions, take-up and let-off motions together with the operation of the magazines and hoppers and methods of changing shuttle and bobbin. A study is also made of the preparation of warps, beaming, sizing and drawing-in. The Crompton and Knowles Automatic Towel Looms, and the various types of box looms, including chain building and work on multipliers, are also considered in this course.

322. Woolen and Worsted Weaving—1 Year.

This course includes instruction on the Crompton and Knowles loom and takes up general construction, head motions, take-up, let-off, filling stop motion, etc. The preparation of warps, wet and dry dressing, is given in connection with this course.

324. Loom Fixing—1 Year

The course in Loom Fixing takes up the timing of all the different motions in the loom, such as the shedding, picking, and adjustment of the shuttle boxes on the 4 x 4 Crompton & Knowles and Draper box and automatic looms, and the setting for the Baker shuttle changing mechanism.

In addition there are many trouble hints given and the various remedies for improper setting. Box chain and harness chain planning and building is also taken up.

CHEMISTRY AND DYEING DEPARTMENT

Hardly any branch of applied science plays so important a part in our industrial world as chemistry. Many large mills employ chemists as well as dyers, and with the great progress which is being made in the manufacture and application of dyestuffs, a basic knowledge of chemistry becomes an absolute necessity to the dyer. Within a comparatively short distance from Lowell are establishments employing men who require some knowledge of chemistry but who may not necessarily use dyes. Some find a knowledge of analytical chemistry helpful in their everyday work.

To meet these varying needs of our industrial community, the school offers a two-year course in general chemistry, organic and inorganic, which may be followed by any one of three courses, viz., textile chemistry and dyeing, analytical chemistry, and textile and analytical chemistry. In order to take Course 412, 413 or 414, candidates must have a certificate from Course 411, or show by examination or approved credentials that they have taken the equivalent of the work covered by this course.

411. General Chemistry—2 Years

Includes Inorganic, Organic and Qualitative Analysis.

The first year work consists of two lectures and two recitations per week in Organic Chemistry upon the following subjects:

THEORETICAL CHEMISTRY.—Chemical action, chemical combination, combining weights, atomic weights, chemical equations, acids, bases, salts, Avogadro's law, molecular weights, formulae valence, periodic law, etc.

NON-METALLIC ELEMENTS.—Study of their occurrence, properties, preparation, chemical compounds, etc.

METALLIC ELEMENTS.—Study of their occurrence, properties, metallurgy, chemical compounds, etc.

Two evenings each week.

During the second year, the classroom work is on the hydrocarbons and their derivatives. The laboratory work in Qualitative Analysis takes up, as thoroughly

as time will permit, the qualitative detection of the more common metals and non-metals. This work, although necessarily elementary, is intended to prepare the student to study more understandingly the manufacture of dyestuffs and coal tar colors in the more advanced courses which follow.

Three evenings each week.

412. Textile Chemistry and Dyeing—3 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Dyeing.

Three evenings each week.

Covered by 60 lectures and two nights of laboratory work per week.

The outline of the lecture course given in Textile Chemistry and Dyeing is as follows:—

CHEMICAL TECHNOLOGY OF FIBERS.—This course consists of a series of lectures on the origin, composition and processing of the natural fibers; also the manufacture and properties of the artificial fibers. The chemical and physical properties of the fibers which influence their suitability for textile uses are emphasized. The following outline suggests the scope of the course:

Classification of fibers by origin, by importance and by chemical composition; properties necessary in a successful textile fiber; chemistry of cellulose, cotton, flax, ramie, jute, hemp, kapok; chemistry of proteins, silk, tussah, wool, reclaimed wool, mohair, other hairs; asbestos; manufactured fibers — history, production of filament and staple fiber, methods of delustering, manufacture of high tenacity yarns, details of manufacture of acetate, cupra, viscose, casein, vinyl, and nylon fibers, comparison of the manufactured fibers with each other and with comparable natural fibers.

OPERATIONS PRELIMINARY TO DYEING.—Bleaching of cotton and linen; wool-scouring; bleaching; carbonizing; silk-scouring and bleaching.

The bleaching of cotton is studied with description of the various forms of kiers and machinery used; also the action of the chemicals used upon the material, and the various precautions that must be taken in order to insure successful work.

Under this heading is included a study of the reagents used in the emulsive wool-scouring process, and their action upon the fiber under various conditions; also the most successful of the solvent methods of degreasing wool.

WATER AND ITS APPLICATION IN THE TEXTILE INDUSTRY.—Impurities present, methods of detection, their effect during the different operations of bleaching, scouring, dyeing and printing, and the methods used for their removal or correction.

The important subject of boiler waters is also studied under this heading, with a full discussion of the formation of boiler scale, its disastrous results, and the methods by which it may be prevented.

MORDANTS AND OTHER CHEMICAL COMPOUNDS USED IN TEXTILE COLORING, AND CLASSIFIED AS DYESTUFFS.—Theory of mordants, their chemical properties and application, aluminum mordants, iron mordants, tin mordants, chromium mordants, organic mordants, tannin materials, soluble oil, fixing agents, leveling agents, assistants, and numerous other compounds not dyestuffs that are extensively used in the textile industry.

Under this heading are included the definitions of various terms and classes of compounds used by textile colorists, such as color lakes, pigments, fixing agents, developing agents, mordanting principles and leveling agents.

NATURAL ORGANIC COLORING MATTERS.—Properties and application of indigo, logwood, catechu or cutch, Brazil wood, cochineal, fustic, tumeric, madder, quercitron bark, Persian berries, and other natural dyestuffs that have been used by textile colorists.

MINERAL COLORING MATTERS.—Under this heading are discussed the properties of such inorganic coloring matters and pigments as chrome yellow, orange and green, Prussian blue, manganese brown, iron buff.

ARTIFICIAL COLORING MATTERS.—General discussion of their history, nature, source, methods of manufacture, methods of classification and their application to all fibers.

Besides lectures and recitations upon the subject of Textile Chemistry and Dyeing, practical laboratory work is required. By the performance of careful and

systematic experiments the student learns the nature of the various dyestuffs and mordants, their coloring properties, their action under various circumstances, and the conditions under which they give the best results. The more representative dyestuffs of each class are applied to cotton, wool and silk, and each student is obliged to enter, in an especially arranged sample book, a specimen of each of his dye trials with full particulars as to the conditions of experiment, percentage of compounds used, time, temperature of dye baths, etc.

For convenience and economy most of the dye trials are made upon small skeins or swatches of the required materials, but from time to time students are required to dye larger quantities in the full-sized dyeing machines.

413. Analytical Chemistry—3 Years

Laboratory Work and Lectures in Quantitative Analysis.

Three nights each week of class-room and laboratory work.

The object of this course is to give the student a general idea of the underlying principles of Analytical Chemistry, with a sufficient amount of laboratory work to enable him to become proficient in performing the ordinary routine analysis of the textile plant. Frequent recitations are held for the discussion of methods and the solution of stoichiometrical problems.

The work covered the first two years is based on Talbot's "Quantitative Analysis," and for the advanced work, consists of the analysis of soap, water, oils, coal and other materials of particular interest to the textile chemist. Special lecture notes are given and "Commercial Methods of Analysis" by Snell and Biffen is used as a text.

414. Textile and Analytical Chemistry—4 Years

Lectures in Textile Chemistry and Dyeing.

Laboratory Work in Analytical Chemistry.

Combines all lectures in Textile Chemistry and Dyeing with work of Course 413, but does not include any Dyeing Laboratory.

Three evenings each week.

415. Chemistry and Technology of Leather—1 Year

Requirements: Two years of evening elementary chemistry and two years of inorganic quantitative analysis. A student without this preparative background or its equivalent will not be admitted to this course.

This is a one year course and treats of the chemistry and technology of leather manufacture. All the tannery processes are taken up with special emphasis on the purpose of each operation. In respect to the chemistry involved a short introduction to the chemistry of proteins and fats and the action of enzymes is presented, and the usual analytical methods are considered. Throughout the course mention is made of recent developments and fields of research.

The early part of the course consists entirely of lectures (three one-hour periods). The latter part consists of one weekly lecture and a two-hour laboratory session.

ENGLISH DEPARTMENT

511. English Composition—2 Years

First Year.—REMEDIAL ENGLISH AND RHETORIC.—In order to write well it is necessary to have a thorough understanding of grammar. Moreover, it is a great satisfaction to know why you are correct in speaking and writing in a certain way. This course is designed to give a comprehensive survey of necessary grammatical and rhetorical principles. The course of instruction consists of lectures, recitations, remedial exercises, and the study of a text book.

One evening each week.

Second Year.—THE PRINCIPLES OF COMPOSITION.—This is an advanced course and is not open to students who have not completed the first year or its equivalent. The primary purpose of this course is to give the student the ability to write clearly and correctly. An intensive study is made of the four divisions of composition—narration, description, exposition, and argumentation—and the art of letter writing. Selections from various authors to be read for general interest and for the purpose

of illustration, are assigned for outside reading. Lectures are given; and home work, the study of a text book, and examinations are required.

One evening each week.

512. Appreciation of Literature—1 Year

This subject is offered for those who wish to enlarge their cultural background and to study the principles of literary appreciation and criticism. Altho there will be emphasis upon literary technique, the constant aim will be to keep this subordinate to the spirit and the message of the selection.

The prose and the poetry studied will be treated analytically, with directed investigation of the various literary appeals—the intellectual, the sensory, the emotional, the aesthetic, the imaginative, and the philosophical. Emphasis will also be placed upon the value of an extensive reading program. (This course will not be given if the registration is less than twenty-five.)

One evening each week.

TEXTILE ENGINEERING DEPARTMENT

This department has arranged to offer those courses of study which lie at the foundation of all engineering. These are designed to give to those engaged in the mechanical, electrical, and manufacturing departments of mills, factories and other industrial establishments an opportunity to learn something concerning the theory underlying the many practical methods which they use in their daily work. Those subjects for which there is usually a regular demand are listed and described below, but similar and allied courses will also be arranged for provided there is a sufficient demand. In the case of all courses there must be an enrollment of at least ten properly qualified students to warrant giving the subject.

The following courses are held two evenings each week, unless otherwise noted.

DRAWING

613. Mechanical Drawing—3 Years

This course is a complete course in drawing and is offered for one having occasion to make a sketch or detail drawing for the purposes of illustration or instruction, or for one who is daily required to work from a drawing or blueprint. It first lays a foundation of the principles of mechanical drawing, and follows this with two years' work in drawing directly from parts of machines, preparing both the detail and the assembly drawing.

The work is so planned that at its completion a man shall be thoroughly familiar with the making of a working or shop drawing. After a study of the underlying principles of projections and instruction in penciling, inking, lettering and tracing, the subject of sketching and the making of detail drawings therefrom is especially stressed. The preparation of assembly drawings is finally considered.

638. Blue Print Reading—1 Year

This course is offered to those who wish only to be able to read drawings. While a fundamental knowledge of orthographic projection is desirable, it is not required. The course covers methods of projection, sections, dimensioning, and standard drawing practice. Blue prints of actual commercial drawings are used.

One evening each week.

MATHEMATICS

620. Mathematics—2 Years

This course is designed to permit the student to pursue further the mathematics of his grammar or junior high school course, and should be taken by all who intend to study further into engineering subjects. The first year work in algebra includes addition, subtraction, multiplication, division, factoring and fractions. Some of the topics treated during the second year are graphical representation, linear equations, radicals, quadratic equations, logarithms, slide rule and trigonometry. Instruction is largely through problem work in class and at home and requires the use of a text book.

631. Plane Geometry—2 Years

In this course the usual theorems and constructions of good text-books are studied. The topics include the properties of plane rectilinear figures, the circle and measurement of angles, similar polygons, areas, regular polygons and the measurement of the circle. Solutions of original exercises and applications of geometry in calculation of angles, areas, and lines will also be given. Assignments for home study will be made.

633. Shop Mathematics—1 Year

This subject deals with the practical application of mathematics which is of the greatest use to machinists or those in similar lines of work. It consists of those parts of arithmetic, algebra, geometry and trigonometry, which are essential in modern machine shop practice. Some of the topics are:—fractions and decimals, logarithms, problems in ratio and proportion, areas of surfaces, calculation of angles, solution of right and oblique triangles.

In addition to the mathematical work, the scientific principles which govern the operation of various machines are studied. In this connection the following topics are included:—verniers and micrometers, levers, belt and gear speeds, screw threads and screw cutting, gear tooth computations, plain and differential indexing. This subject requires home problem work and the study of a textbook.

ENGINEERING

614. Machine Shop Practice—2 Years

This course offers an opportunity to learn the art of metal working and is equally valuable to the man who already has some knowledge of the methods employed as to one who has no knowledge of the same. Thus it becomes possible for one who may be working at the bench during the day to learn how to operate a lathe or other machine tool, or for a lathe hand to acquire a knowledge of a planer, shaper, milling machine, or grinder. A series of lectures is given on the care and management of tools, tool grinding, and the mechanism of the machines. A man who only has a knowledge of the special machine he operates may by means of this course become a more intelligent machinist. He should supplement this study with the courses in Mechanical Drawing, Shop Mathematics, Mechanics, and Mechanism, in order that his training for an all-round machinist or mechanic may be more complete.

621. Strength of Materials—1 Year

This interesting subject deals with those important principles whereby the person engaged in machine, engine, mill or building design may ascertain whether the parts are strong enough to carry the forces and loads which the nature of the construction imposes upon them.

The fundamental stresses of tension, compression and shear are first considered, together with the ultimate strength of cast iron, wrought iron, steel, and timber. The practical use of this information is illustrated in the design of bolts, tie rods, columns, wall piers, boiler shells, riveted joints, etc. This is followed by a study of the stresses in and design of beams under various conditions of loading, and the course concludes with a discussion of the torsional stresses and twist in shafts. A knowledge of the principles of Mechanics and Mechanism is highly desirable to a satisfactory understanding of this subject. The method of instruction is through lectures, recitations, problems, and the use of a text book.

622. Steam—1 Year

It is the purpose of this course to study the various methods of heat generation, transmission, and utilization in use at the present day and to learn the theoretical relationship which underlie these processes and transformations.

The instruction covers, so far as time permits, the elements of steam engineering. The topics covered are heat and its measurement, use of steam tables, types of boilers, engines and turbines, boiler and engine room accessories, together with a study of the methods of testing the various types of apparatus. Actual tests on such equipment are made as the size of the class permits. Text books, laboratory and class work, and home problems are the methods of instruction used.

630. Mechanism—1 Year

This course deals with those principles which are used in the transmission of force and motion through machines and mechanical devices. It requires a knowledge of mechanics, and hence instruction will be given in the principles of uniform and accelerated motion, moments of force, and other topics in mechanics. The instruction in mechanism includes pulleys, belting, gears, gearing, cams and other devices. No student who is not thoroughly familiar with elementary mathematics should undertake this course. Home problem work and the study of a textbook are required.

632. Diesel Engines—1 Year (Will not be given in 1945)

The object of this course is to present an elementary study of Diesel engines, their operation, and maintenance. The subjects studied include—the various forms of Diesel engines in general, two and four cycle, semi-Diesel, etc.; a comparison between gasoline and oil engines; fuel oils—heat value, properties; fuel injection systems—control, timing, distribution; combustion—efficiency, control, products; engine parts and their functions—assembly, clearances, wear; lubricating oils—properties, filtration; cooling systems—heat transfer, radiation; air intake and exhaust systems—supercharging, silencing, heat recovery; starting systems—air, electric, gasoline; engine installations—vibration; engine applications—mobile, stationary; and maintenance in general for an entire power plant.

No student should undertake this course who is not familiar with elementary physics and mathematics, as considerable time will be spent on the materials used and the reactions involved in an internal combustion engine. The subject requires home problem work, study of a text book, and examination at the end of each term.

634. Air Conditioning—2 Years (Will not be given in 1945)

The subjects covered in this course include the following; fundamental laws, principles and definitions; physical properties of the atmosphere; explanation of words and terms used, such as—matter, energy, heat, heat energy, temperature, ice, water, vapor, gas, steam, thermometers, hygrometers, hydrometers, barometers, pressure, gage pressure, absolute pressure, absolute temperature, laws of gases, heat units, vapor pressure, dew point, evaporation, condensation, precipitation, relative and absolute humidity; sensible heat, latent heat, specific heat, total heat of air, effective temperature, comfort zones, air movement, ventilation; movement of heat and air, infiltration, conduction, solar heat, air leakage; heat from human beings; lights, machinery and processes; humidification and dehumidification, heating and cooling, air filtration, air washing; refrigeration and refrigerants, cooling by water, ice, typical air-conditioning equipment, typical control equipment, thermostats, humidostats, wet and dry bulb type; use of charts and tables, costs, etc.

Students are required to hand in complete details for producing prescribed conditions of temperature and humidity in some building in or near Lowell, Mass., before completing the course.

639. Textile Testing—1 Year

This subject is planned to present the fundamental knowledge required in determining the physical properties of textiles and the interpretation of the resulting data. So far as time permits the following topics form the basis of the lectures: textile fibers, their identification and properties; machines, equipment and procedures for determining breaking strength, elongation, fabric structure, tear resistance, bursting strength, crimp, twist, regain, air permeability, water resistance, thermal transmission, resistance to mildew, moths and fire, color fastness, abrasion, shrinkage; specifications, their sources and interpretation; statistical analysis of data.

In order to include some laboratory work, it is necessary to limit the size of the class to a maximum of ten qualified persons.

SALES**628. Selling and Advertising—1 Year. (Will not be given in 1945)**

This course covers the basic principles of both salesmanship and advertising. Problems on the construction of individual advertisements, selling talks, and the planning of advertising campaigns, give the student an opportunity to put into practice the principles covered in the lectures.

The psychology of selling and advertising, copy writing, layout, printing and engraving, illustrations, testing of advertising, advertising campaigns, building a selling talk, retail salesmanship, and showmanship are some of the topics treated.

ELECTRICITY

635. Practical Electricity—1 Year (Will not be given in 1945)

The purpose of this course is to aid students who wish to advance themselves in any one of the electrical trades. The course will cover the underlying facts and laws of good electrical practice which the really well-informed and efficient workman must understand.

Lectures will be given one night each week on the following subjects: the nature of magnetism, Ohm's Law, simple electric circuits, combinations of series and parallel systems, wiring diagrams, electric bulbs and telephones. The practical part of the course, given one night each week, is divided into several experiments which will give the student a working knowledge of electrical wiring and installations.

636. Electrical Circuits and Machinery—2 Years

This course is planned to cover the fundamentals of electrical circuits and machinery. The lectures on electrical theory are supplemented by laboratory work, the use of a textbook, and the solution of problems. A considerable amount of home study and preparation are required. Students who wish to take this course must have studied one year of algebra.

The first year is devoted to the study of direct and alternating current circuits. The topics include Ohm's law, calculation and measurement of resistance, power, relation between electrical and other units of energy, magnetic fields, inductance, capacitance, and impedance of alternating current circuits.

The second year takes up the design and operation of direct and alternating current machinery. Part of the time is devoted to laboratory work to make the student familiar with methods of operating and testing electrical machinery.

640. Fundamentals of Electronics—2 Years

First Year.—ELEMENTS OF ELECTRICAL CIRCUITS. Study of Direct and Alternating Current Circuits. Topics include Ohm's Law, series and parallel resistance, power, magnetic fields, inductance, capacitance, impedance of AC circuits. Part time is devoted to the laboratory for study of instruments in making circuit measurements.

Second Year.—FUNDAMENTALS OF ELECTRONICS. Vacuum tube theory, vacuum tube applications including rectifiers, power supplies, and amplifiers; classes of amplifiers; voltage-gain and power amplifiers; amplifier characteristics; electronic instruments.

641. Industrial Electronics—3 Years

First Year.—ELEMENTS OF ELECTRICAL CIRCUITS. Study of Direct and Alternating Current Circuits. Topics include Ohm's Law, series and parallel resistance, power, magnetic fields, inductance, capacitance, impedance of AC circuits. Part time is devoted to the laboratory for study of instruments in making circuit measurements.

Second Year.—FUNDAMENTALS OF ELECTRONICS. Vacuum tube theory, vacuum tube applications including rectifiers, power supplies, and amplifiers; classes of amplifiers; voltage-gain and power amplifiers; amplifier characteristics; electronic instruments.

Third Year.—INDUSTRIAL ELECTRONICS. Tubes; theory and operating characteristics of photo-electric, both gas and vacuum tubes, and the thyatron. Amplifiers; resistance coupled, circuits, and applications to other than communication field. Electronic relays and timers; theory and circuit analysis of commercial DC and AC timers, relays and switches in timing devices, and applications to industry. Light sensitive control equipment; light sources, simple photo-electric relays, amplifiers and phototube combinations, commercial type photoelectric relay. Thyatron applications; phase shifts, inverters, rectifiers, motor and welder control,

textile and other applications. Electronic heating devices; oscillators, circuit components, commercial applications. About one-third of the time will be devoted to laboratory work.

642. Principles of Radio—3 Years

First Year.—ELEMENTS OF ELECTRICAL CIRCUITS. Study of Direct and Alternating Current Circuits. Topics include Ohm's Law, series and parallel resistance, power, magnetic fields, inductance, capacitance, impedance of AC circuits. Part time is devoted to the laboratory for study of instruments in making circuit measurements.

Second Year.—FUNDAMENTALS OF ELECTRONICS. Vacuum tube theory; vacuum tube applications including rectifiers, power supplies, and amplifiers; classes of amplifiers; voltage-gain and power amplifiers; amplifier characteristics; electronic instruments.

Third Year.—PRINCIPLES OF RADIO.—Audio systems including telephones, microphones, loud speakers; electro-magnetic transmission and radio propagation including waves, antennas, transmission lines; amplitude modulation communicating systems; vacuum tube applications in radio transmitters, modulators, detectors; radio receivers, including tracking and alignment; frequency modulation; electronic servicing instruments and equipment. One-third of the time is devoted to laboratory work.

643. Cathode Ray Oscilloscope—3 Years

First Year.—ELEMENTS OF ELECTRICAL CIRCUITS.—Study of Direct and Alternating Current Circuits. Topics include Ohm's Law, series and parallel resistance, power, magnetic fields, inductance, capacitance, impedance of AC circuits. Part time is devoted to the laboratory for study of instruments in making circuit measurements.

Second Year.—FUNDAMENTALS OF ELECTRONICS.—Vacuum tube theory; vacuum tube applications including rectifiers, power supplies, and amplifiers; classes of amplifiers; voltage-gain and power amplifiers; amplifier characteristics; electronic instruments.

Third Year.—CATHODE RAY OSCILLOSCOPE.—The theory of the cathode ray tube including elementary electron optics, block diagram, functions of the various elements, fluorescent screen, electrostatic and magnetic deflection. Study of sweep circuits and saw-tooth oscillators, wobblers, and frequency modulators. Block diagram of typical oscilloscope components and controls. Power supplies, deflection plate amplifiers, and oscilloscope circuits analyzed. Graphical analysis of action of horizontal and vertical plates in producing typical patterns on the screen. Laboratory application of the oscilloscope and auxiliary equipment, as far as time permits, in wave form study, frequency measurement, response curves, selectivity curves, distortion, phase angle, modulation, industrial circuit problems.

FINISHING DEPARTMENT

In this course machine work is supplemented by lectures and discussions pertaining to the many finishes given to fabrics. The action of soaps, water, steam, heat and cold upon cloth containing one fiber or combination of fibers as used in commercial fabrics is carefully studied. This course also helps the finisher to broaden his knowledge of textile fabrics.

710. Woolen and Worsted Finishing—1 Year

The outline of this course, which is given chiefly by means of lecture work, is as follows:

BURLING AND MENDING.—Under this head are taken up for consideration the examination of flannel as it comes from the loom; the construction, use and location of the perch; the methods used in marking defects, measuring, weighing and numbering of cloths; also the methods of inspection for fancies, single cloths and double cloths. The object of burling, mending and the types of tables employed, the

method of removing knots, runners, etc., the object of back shearing and the use of burling irons, the replacing of missing threads and the importance of sewing as a part of the finishing process, are also considered in detail. The removal of oil and tar spots as well as stains of various kinds is studied.

FULLING.—This branch covers a study of the conditions of the flannel as it comes from the loom, and the influence of oil, etc., upon the procedure. Considerable time is devoted to the various methods of producing a felt, the various types of stocks and their modifications and development into the present type of rotary fulling mills of both single and double variety. The details of construction in all machines are carefully taken up and include the design and composition of the main rolls, method of covering, regulation and means of adjusting the pressure of traps and rolls, and the use and regulation of the various types of stopmotion, the different types of stretchers, guide rolls and throat plates.

The theory of felt is taken up and the influence of pressure, moisture, heat, alkali and acid is considered, as well as the hygroscopic and felting properties of different wool fibers. The preparation of the flannel for the mill and the usual methods of determining shrinkages, as well as the various methods of soaping, are given careful attention. The preparation of various fulling soaps and the value of each for the production of various degrees of felt, as well as the determination of the proper amount of alkali for various goods, are carefully studied and demonstrated. The manipulation of the various kinds of goods in the mill, viz., all wool, reworked wools and mixed goods, is studied in classroom and by operation in the laboratory.

The change in weight and strength for each operation is carefully considered, as is also the value of the flocks made in each. A study of the various methods of flocking, such as dry and wet, is considered in both class and machine rooms. In each operation the defects likely to materialize are studied, as well as the cause thereof, and various methods of modifying or lessening them.

WASHING AND SPECK DYEING.—This branch considers the scouring, rinsing and washing of goods before and after the fulling process; the various types of washers; and the details of construction, such as suds box, rolls, etc. The theory of scouring, uses of Fuller's earth, salt solutions and sours on the different kinds of goods are made clear by practical work in the machine room, where the effects due to improper scouring, such as stains, cloudy effects, wrinkles and unclean goods, are demonstrated. The discussion of the necessity of speck dyeing follows naturally from the study of these matters, and includes methods of preparation, materials used, application and tests required.

CARBONIZING.—This is an important branch of finishing, and includes a study of the various carbonizing agents, methods of application, strength of solutions and neutralizing, as well as the machines used. Stains and imperfections resulting from carbonizing are also considered. The drying and tentering machines and extractors employed are taken up at this point.

GIGGING, NAPPING AND STEAMING.—The construction in detail of the various types of gigs, nappers, steamers, wet gigs, rolling, stretching, crabbing and singeing machines is discussed, and their actions upon the cloth and the results obtained are explained.

Various methods of obtaining luster and the production of permanent finish are considered in connection with steaming and sponging.

BRUSHING, SHEARING AND PRESSING.—This includes, as do the other branches, a careful treatment of the machine employed, the preparation of the cloth for each process, the action of each machine in producing its part of the resultant effect. In the manipulation of the shear consideration is given to its setting, grinding and adjustment. With the brushing machine the effect of steaming and moisture upon the luster and feel of the goods is shown. A study of the action of the presses, both plate and rotary, involves consideration of pressure, steaming, etc. Special processes to obtain particular effects are taken up, and the part played by each machine is explained. The details involved in handling cloth on a commercial scale, as, for example, measuring, weighing, ticketing, numbering and rolling, are also explained. The necessary calculation and the methods of finishing all grades of goods are considered from time to time during the year.

2 EVENING GRADUATES OF 1945

Certificates awarded as follows, April 3, 1945:

Wool and Top Making — One Year

Aylward William Corcoran, Methuen	John William Moore, Lowell
Ralph Seth Giffin, Jr., Lowell	Edith Eloise Rogers, Lawrence
Bernard Arthur Hollins, Methuen	Earl Herman Strauch, Methuen
Grace Patricia Hughes, Lawrence	James Edmund Turton, No. Andover
Lennart William Leedberg, No. Chelmsford	Rudolph Gerard Vaillancourt, Lawrence
Fernand Joseph Marceau, Lawrence	Eugene Joseph Wilson, Methuen

Worsted Yarns — One Year

Clemens Carl Hoh, Methuen	Richard Paul Lynch, Andover
Horst Karl Muhlinghaus, Newtonville	

Cotton Design — Three Years

Antonio Joseph Boisjoly, Lowell	Frank William Sledziewski, Lowell
Isaac Cohen, Lowell	Robert Homer Smith, Nashua, N. H.
Foris Vernon Welch, Nashua, N. H.	

Woolen and Worsted Design — Three Years

Michael Martin Bonczar, No. Billerica	Stanley Vincent Bonczar, No. Billerica
John Joseph Yarnall, Methuen	

Decorative Art — Three Years

Patricia Anne Crawford, Tyngsboro

Loom Fixing — One Year

Philip Louis Beaulieu, Andover	Raymond Joseph Dumais, Nashua, N. H.
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Woolen and Worsted Finishing — One Year

Michael Martin Bonczar, No. Billerica	Elias Louis Khoury, Lawrence
James Peter Dempsey, Lowell	Alfred Johnson Lombard, Andover
Melvin William Donnellan, Lowell	Paul William O'Neil, East Chelmsford
William Earl Rutman, Lawrence	

Elementary Chemistry — Two Years

Rosemary Winifred Billingsley, Lowell	Francis Joseph Buckley, Lowell
Theresa Francis Miller, Lowell	

Textile Chemistry and Dyeing — Three Years

Oscar Hans Hansen, Lowell	Alvin Emil Huebner, Lawrence
John Alexander McKay, No. Billerica	

Analytical Chemistry — Three Years

George Amedee Bordeleau, Lowell

English Composition — Two Years

Grace Rita Carnevale, Lowell	Nettie Arlene Humphreys, Lawrence
Adele Myrtle Fritz, Westford	Vera Nyder, Graniteville

Mechanical Drawing — Three Years

Rita Frances Casby, Lawrence	Norman George Melendy, Lowell
Earl Beckworth Davis, Tyngsboro	Lionel Roger Thibodeau, Lowell
William Frank Hildebrandt, Lawrence	Edward Vincent Whalen, So. Chelmsford

Blue Print Reading — One Year

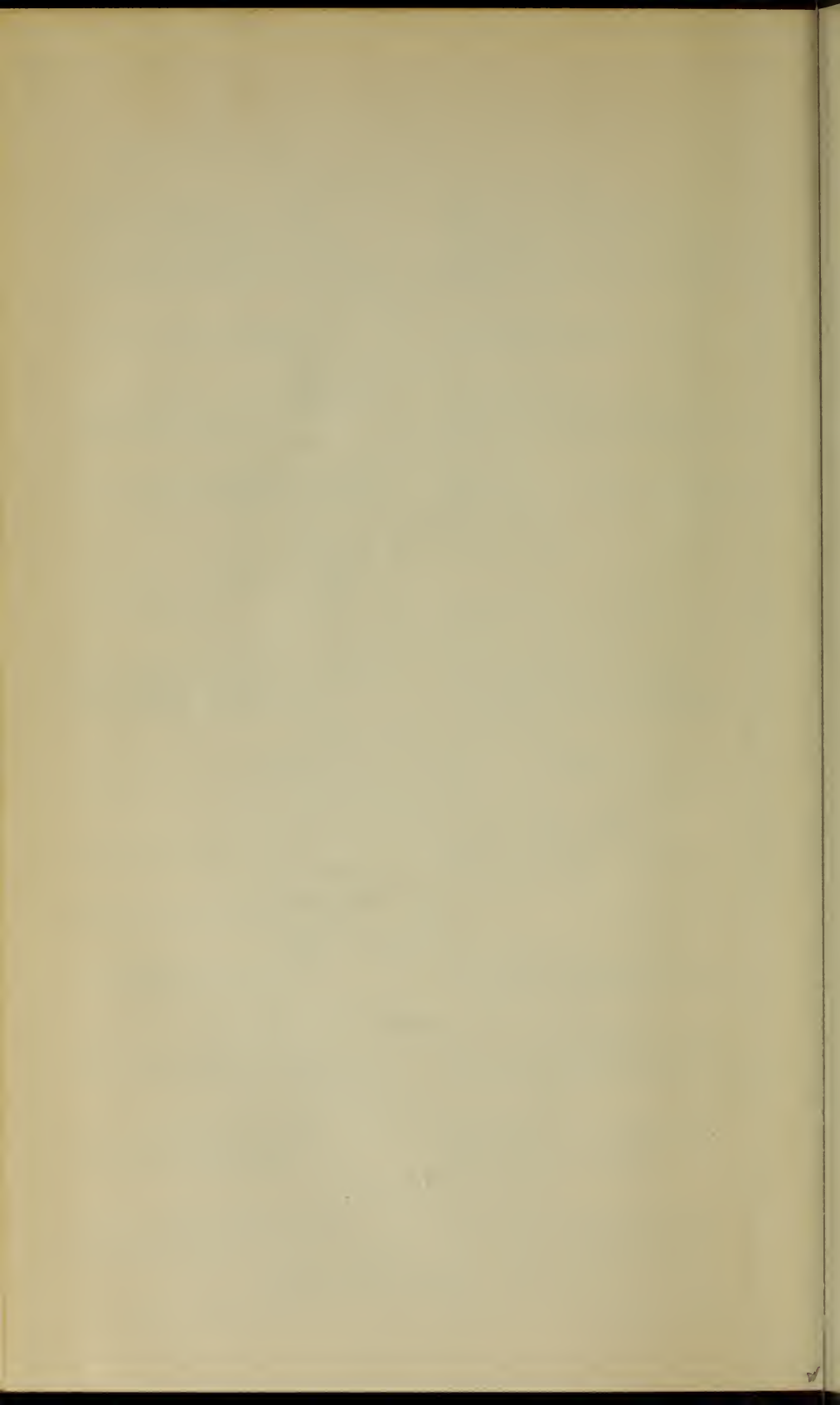
Daniel Albert Fusconi, Lowell	Albert Joseph Narbonne, Lowell
John William Keenan, Lowell	Stephanie Mary Poremba, Lowell
Gerard Amedee Marchand, Lowell	Stanley Zbieg, Lowell

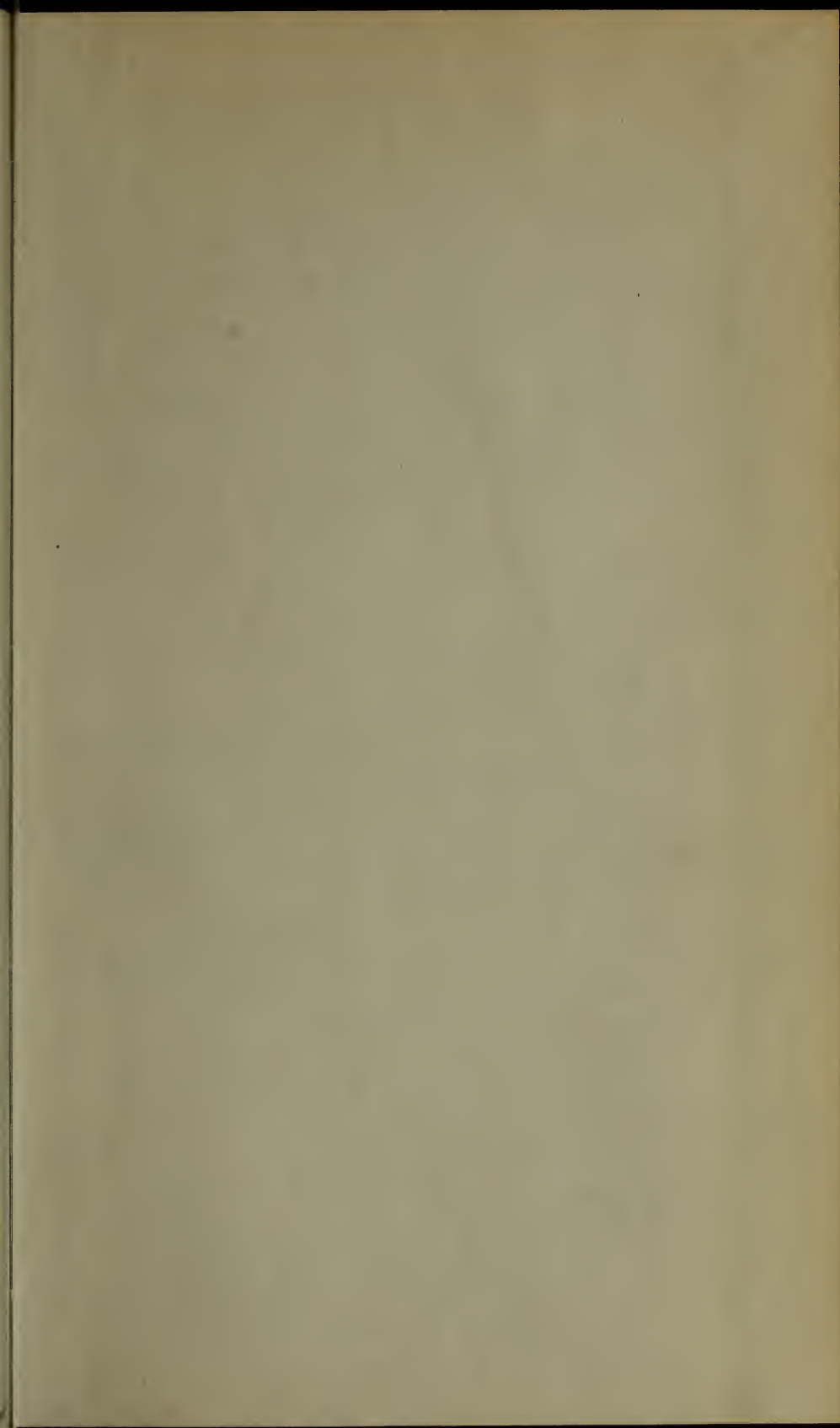
Mathematics — Two Years

Anthony Joseph Cullinan, Dracut	George Peter Neofotistos, Lowell
George John Hondras, Lowell	James Thomas Simpson, Lowell
Natalie Vivian Johnson, West Chelmsford	Lionel Roger Thibodeau, Lowell

Machine Shop Practice — Two Years

James Arthur Braga, Lowell	William Lawrence Peterson, Lowell
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WELLS BINDERY
WALTHAM, MASS.
DEC. 1949

